



Unifying Effectiveness and Efficiency in Sustainable Supply Chain Management in Automotive: the 21st EWA Edu Model Enhanced by Wholeness Systems Thinking for Lifelong Learning

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Abstract: The contemporary business environment is characterized by VUCA (volatility, uncertainty, complexity, ambiguity), influencing many industries, notably automotive. As humanity encounters the finite constraints of Earth's ecosystems, it becomes imperative for strategic management to transcend mere economic metrics and incorporate environmental and social dimensions. This paper explores the critical role of Wholeness Systems Thinking (WST) in transitioning from traditional Knowledge-based educational frameworks that emphasize a Maximization Mindset to those fostering an Understanding-based, Purposeful mindset in lifelong learning. Employing the sustainable educational model, 21st EWA Edu, this approach cultivates a human capital intellectual capability. Furthermore, the study investigates how this paradigm aids in harmonizing the concepts of effectiveness and efficiency within Sustainable Supply Chain Management (SSCM). The findings indicate that when applied to lifelong learning, this novel intellectual capacity not only refines decision-making processes but also ensures alignment between long-term sustainability objectives and short-term operational strategies in the automotive sector.

Keywords: Systems Thinking in Education, Sustainable Supply Chain Management, Lifelong learning, Understanding-based education, Wholeness System Thinking, DIKW, DIKHUW

1. Introduction

In an era of volatility, uncertainty, complexity, and ambiguity (VUCA), the automotive industry faces unprecedented challenges that demand innovative responses. As these sectors grapple with the rapid pace of change and the unpredictability of global markets, it becomes imperative for strategic management to evolve. Traditional approaches, predominantly focused on economic gains (Wozniak & Jakubowski 2015), are increasingly insufficient. Today's complex business environments require that strategic considerations extend their scope beyond economic dimensions to embrace environmental (Lenort et al. 2019) and social sustainability.

Lifelong learning is increasingly recognized as essential to thriving in the current VUCA world, leading to a shift away from the traditional educational models divided strictly into pedagogy (the method and practice of teaching children) and andragogy (adult learning). Lifelong learning is vital in replacing or expanding beyond these traditional approaches and supporting human capital development. This necessity for a broader perspective is underscored by the pressing constraints of planetary boundaries, which pose significant risks and opportunities for leading businesses worldwide. In response, this article explores the adoption of Wholeness Systems Thinking (WST), a paradigm shift that moves beyond conventional knowledge-based strategies enhancing Maximization mindset in education to an understanding-based, Purposeful mindset. This mindset is crucial for integrating diverse aspects of business operations into a cohesive strategy that addresses immediate profitability and ensures long-term sustainability.

At the heart of this transformative approach is the 21st EWA (Empowering Wholeness Adaptive) Edu, a sustainable education model that champions the new intellectual capacity termed Understanding of Wholeness. This concept is pivotal in fostering a wholistic view of organizational strategies, unifying various components of strategic management to enhance both effectiveness and efficiency. A unified approach helps mitigate the conventional negative impacts stemming from the inability to recognize and properly integrate the fundamental differences between the concepts of effectiveness and efficiency and their correct application. Through this lens, the study investigates how strategic sustainability can be effectively and efficiently (not vice-versa as common today) integrated within the Sustainable Supply Chain Management of a leading 1st tier global automotive producer.



This research aims to provide a unifying approach to efficiency and effectiveness in Sustainability Supply Chain Management (SSCM), exemplified through a concrete case study. This approach aims to enhance decision-making processes and align short-term operational tactics with long-term sustainability objectives. By doing so, it offers a novel framework for organizations striving to balance immediate operational demands with overarching strategic sustainability imperatives, thus contributing significantly to the field of strategic management in high-stakes environments.

One of the main shortcomings of modern society is the confusion between knowledge and understanding. This confusion extends to the distinction between efficiency and effectiveness, doing things right and doing the right things, growth and development, and standard of living and quality of life, etc. Clarifying and understanding these differences is the first step toward refocusing education on fostering a happy and sustainable way of life rather than merely supporting higher living standards at the expense of environmental considerations.

2. Literature Review

The VUCA environment amplifies these educational challenges by adding layers of complexity and unpredictability. Volatility refers to the rapid rate of change in our globalized world, which can quickly render learned knowledge obsolete. Uncertainty complicates the learning path as future trends and needs become harder to predict. Complexity arises from the interconnectedness of systems and information, demanding that learners acquire knowledge and understand its interrelations. Ambiguity challenges learners to navigate through unclear information and conflicting interpretations, requiring robust critical thinking and decision-making skills (Sinha 2020).

Current educational systems face significant challenges when facing a VUCA (volatile, uncertain, complex, and ambiguous) environment. Traditional educational systems often emphasize knowledge acquisition – memorizing facts and figures without necessarily understanding their broader context or applications. This approach is increasingly seen as insufficient in today's rapidly changing world, where understanding and the ability to adapt knowledge creatively and innovatively are crucial. An understanding-based approach demands deeper cognitive skills like critical thinking, problem-solving, and the ability to relate and apply knowledge in diverse, real-world situations. In response, educational systems need to adopt more dynamic and flexible learning models that are capable of adapting to changing conditions and preparing students not just to know but to understand and act effectively within these complexities. Addressing these challenges involves rethinking educational goals and methods. For instance, embracing systems thinking as a core component of curriculum design can help students grasp the interconnectedness of knowledge across different domains. Furthermore, fostering a culture of continuous learning and adaptability within educational institutions is crucial. This involves integrating strategies like design thinking, systems thinking, and collaborative learning, which enhance the capacity to deal with ambiguity and complexity (Holman 2023). Leadership within educational institutions plays a pivotal role. Leaders must foster a responsive and adaptable organizational culture that can thrive in a VUCA world (Kumar et al. 2024). This includes promoting values such as integrity, empowerment, and continuous learning, essential for creating resilient learning communities. Ultimately, the shift towards an understanding-based educational model in a VUCA world is not just about changing curricula but transforming the very culture and strategies of educational systems to be more adaptive, integrative, and responsive to the complexities of the 21st century.

Rapid changes and unpredictability characterize the VUCA environment. Lifelong learning enables individuals to adapt continuously to new technologies, work practices, and societal shifts. This adaptability is essential because the skills and knowledge that are relevant today may not be sufficient tomorrow. Traditional educational models often consider learning to be confined to early life stages – school and college – which does not suffice in a world where new knowledge is constantly being created (Waller et al. 2019).

As economies evolve, the workforce needs to adapt to remain relevant. Lifelong learning is essential for economic flexibility and sustainability, ensuring that the workforce can meet the demands of changing industries and technologies (Szajna et al. 2021). Lifelong learning promotes social inclusion by providing learning opportunities to diverse groups of people, including older adults, minorities, and those changing careers. This inclusivity helps mitigate social disparities and promotes a more equitable society. Lifelong learning encompasses continuous professional development, allowing individuals to stay competitive in their careers by constantly updating their skills and knowledge. There is a growing divide between the skills provided by traditional education systems and the skills demanded by modern workplaces. Lifelong learning bridges this gap by providing ongoing education and training opportunities that are more aligned with current and future job market needs. Lifelong learning is not only about professional development but also personal growth. It encourages a culture of curiosity and learning, fostering personal fulfillment and resilience, which are crucial in handling the complexities and stresses of modern life (Ali 2023).

The shift towards lifelong learning is a response to the complexities and rapid changes characteristic of the VUCA world. This approach supports continuous adaptation and development and ensures that education remains relevant and responsive to the needs of individuals and societies (Seevartnam 2023).

2.1. 21st EWA Edu model

The 21st Century Empowering Wholeness Adaptive (EWA) Educational Model emphasizes a transformative approach to learning, especially suited to address modern sustainability challenges through education. This model integrates WST, advocating for a wholistic view in educational strategies, which means learning is not just about accumulating knowledge but understanding and acting within interconnected systems with a focus on sustainable future goals. It recognizes two levels of education: the traditional Knowledge-based education connected with Learning by Doing and proposed Understanding-based education assured by Learning by Asking the Purpose creating the newly defined intellectual capacity Understanding of Wholeness (Fig. 1) (Holman & Švejdarová 2023).

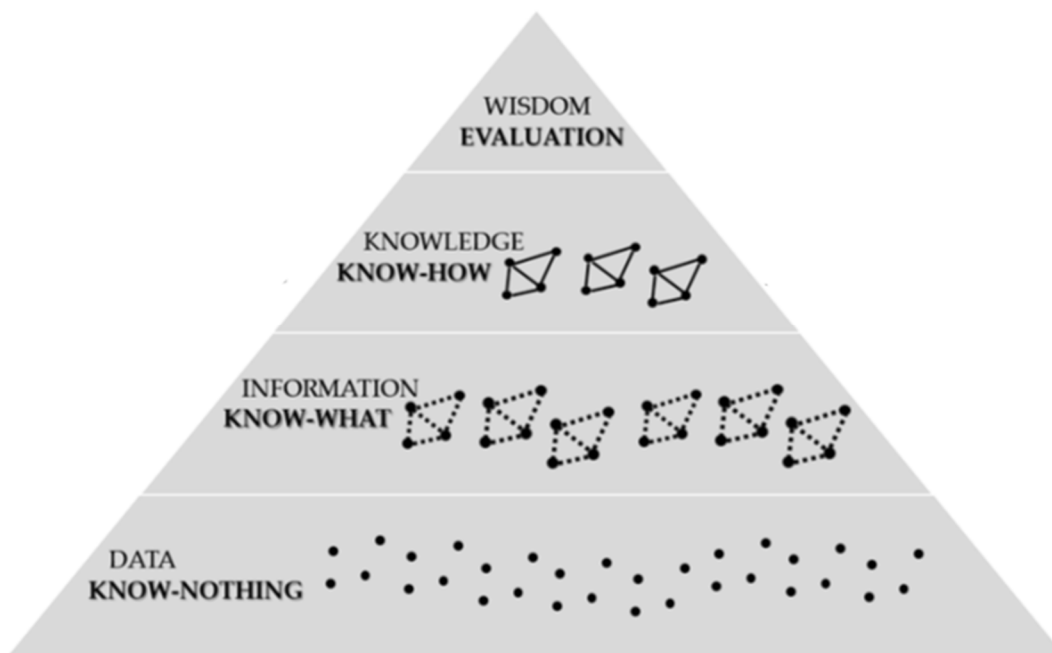


Fig. 1. DIKW hierarchy presenting the hierarchy from Know-What > Know-How (Holman & Švejdarová 2023)

2.1.1. Knowledge-based education supporting Maximization Mindset

Knowledge refers to collecting specific information, facts, and skills acquired through experience or education. It is the awareness or familiarity gained by experience of a fact or situation. Knowledge can be superficial, often requiring memorization without comprehension.

Information (Know-What) arises from processing raw data to add meaning. When data (raw, unorganized facts) is contextualized, categorized, and calculated, it becomes information. It tells you what the data represents or what is pertinent in a digestible format.

Knowledge (Know-How) involves the acquisition of facts, figures, and basic concepts. It primarily gathers information that can be directly applied to perform tasks or solve simple problems. This is the foundational level of learning where individuals learn the "how" of things, such as procedures or techniques.

Mindset refers to a person's mental attitude, beliefs, and assumptions that shape their thoughts and behavior. Mindset can be categorized into different types: a growth mindset (believing abilities can be developed) or a fixed mindset (believing abilities are static). Mindset influences how individuals interpret and respond to their conscious experiences. It shapes the lens through which they view the world and themselves. Additionally, we will explore two distinct mindsets: the Maximization mindset and the Purposeful mindset. These mindsets can be put to practical use when overseeing social systems, such as companies and their sourcing and distribution networks.

The maximization mindset focuses primarily on achieving the maximum or more in various aspects of life, such as success, wealth, recognition, and personal achievements. It often emphasizes external measures of success and accomplishment. Individuals with a Maximization Mindset tend to set ambitious goals and seek continuous improvement and expansion in their endeavors. They may pursue excellence and mastery in their chosen fields. This mindset is often driven by a desire for achievement, competition, and the pursuit of personal

and material success. It can be associated with a strong work ethic and a focus on individual accomplishments. People with a Maximization Mindset may make decisions based on the potential for greater success, even if it involves taking calculated risks or pursuing new opportunities. A maximization mindset can be defined as an approach that emphasizes accumulating and utilizing as much data, information, and knowledge as possible to achieve the highest measurable outcomes. This mindset is typically focused on achieving quantifiable results and optimizing specific desired outputs, often at the expense of broader, qualitative aspects of learning and development.

Data: At the data level, a maximization mindset might focus on collecting as much raw data as possible, irrespective of its immediate relevance or usefulness. The goal is to have extensive datasets that can potentially be mined for insights.

Information: The maximization approach prioritizes processing and structuring data to extract the most useful facts when converting data to information. This involves maximizing the efficiency of information retrieval systems to enhance accessibility and usability.

Knowledge: In terms of knowledge, this mindset drives information aggregation into comprehensive bodies of knowledge. Education systems might focus on imparting as much knowledge as possible within educational curriculums, often aiming to cover broad subjects extensively.

Wisdom: At the wisdom level, the maximization mindset may be less evident because wisdom requires the judicious use of knowledge, considering ethical implications and the impact of decisions. However, in a knowledge-based system, there might be efforts to systematize approaches to decision-making to maximize strategic outcomes.

While effective for achieving specific, measurable goals, the maximization mindset can neglect the importance of holistic educational outcomes such as critical thinking, creativity, and ethical reasoning, which are crucial for full intellectual and personal development. This mindset can lead to a focus on short-term results rather than long-term understanding and sustainable growth. Pursuing maximum data, information, and knowledge can lead to inefficiencies and resource wastage, as not all accumulated resources are valuable or necessary. In educational settings, this approach can lead to burnout and stress among learners and educators, as the emphasis is often on quantity rather than quality of learning (Fig. 2) (Holman & Švejdarová 2023).

2.1.2. Understanding-based education supporting Purposeful Mindset

In essence, the development from Knowledge to Wisdom in this educational model is a journey from acquiring practical skills to developing a deep, systemic, and purposeful understanding of complex systems, culminating in the capacity to make wise decisions that consider both the broader context and ethical implications. Each step builds upon the previous one, requiring an increasingly sophisticated level of cognitive and emotional engagement with the content and context. This developmental pathway is designed to transform learners into well-rounded individuals who are not only capable of handling complex and unpredictable situations but also capable of leading and making changes that positively impact their environments. This approach is particularly vital in educational frameworks that aim to prepare learners for the challenges of the 21st century, emphasizing sustainability and ethical responsibility.

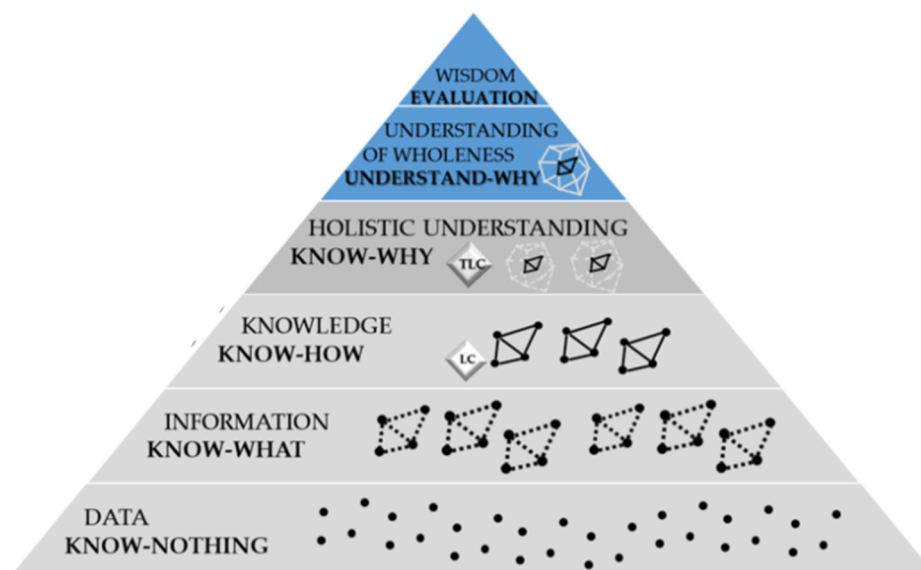


Fig. 2. DIKHUW pyramid presenting the hierarchy from Know-What > Understand Why (Holman & Švejdarová 2023)

Based on the distinctions outlined in the context of the 21st EWA Edu model, the differences between the proposed intellectual capacities of Holistic Understanding, Understanding of Wholeness, and Wisdom are defined as follows.

Holistic Understanding (Know-Why) This level goes beyond mere knowledge acquisition; it involves synthesizing and integrating knowledge from various sources and experiences. Holistic understanding is about seeing the interconnections and relationships between different pieces of knowledge. Learners at this stage begin to understand how different elements work together in various systems, gaining insights through the study of real-world applications and outcomes. It is assured by Learning by studying the consequences, which is worthy during a stable external environment but becomes irrelevant in the era of VUCA challenges and changes.

Understanding of Wholeness (Understand-Why) This deeper level of understanding focuses on the "why" behind the information and systems. It involves a systemic view of the purposes and underlying principles governing systems. This understanding is crucial for addressing complex problems in a VUCA (volatile, uncertain, complex, ambiguous) environment, where the ability to question and understand the purpose behind actions leads to more sustainable and effective solutions. The systematic approach to interconnecting up to the now fragmented world is supported by Learning by Asking the Purpose by Wholeness Synthesis, its three steps, and Wholeness Analysis and its three steps.

Wisdom involves using the deep insights gained from Understanding of Wholeness to make informed, ethical decisions that reflect a broader, more complex understanding of the world. This stage is characterized by the capacity to evaluate and integrate various forms of understanding into a coherent whole that guides behavior and decision-making in a way adaptable to new information and changing circumstances.

A Purposeful Mindset places a stronger emphasis on finding meaning, fulfillment, and a sense of purpose in life. It is more inwardly focused and emphasizes intrinsic values and personal growth. Individuals with a Purposeful Mindset set goals aligned with their core values, passions, and a sense of meaning. Their goals often revolve around positively impacting or contributing to something greater than themselves. This mindset is motivated by a desire to live a meaningful and fulfilling life. It may prioritize well-being, personal growth, and pursuing values-based goals over external validation. People with a Purposeful Mindset tend to make decisions that align with their values and sense of purpose. They may be more focused on the long-term impact of their choices.

In summary, the key difference between a Maximization Mindset and a Purposeful Mindset lies in their primary focus and motivation. While a Maximization Mindset is focused on achieving external success and maximizing accomplishments, individuals seek to maximize gains, profits, productivity, or success within a given framework. The focus is on achieving the highest possible level of performance or reaching predefined targets, often emphasizing short-term gains or efficiency. In comparison, a Purposeful Mindset places a greater emphasis on living a life guided by intrinsic values and personal fulfillment. A purposeful mindset is driven by a clear sense of purpose, meaning, and values. It involves understanding one's unique role in the world and seeking to make a difference, often focusing on long-term fulfillment, effectiveness, and sustainable outcomes (Holman & Švejdarová 2023).

2.2. Sustainable Supply Chain Management

2.2.1. Planetary Boundaries (Sweden)

The concept of planetary boundaries was developed by a group of scientists led by Johan Rockström at the Stockholm Resilience Centre. The framework identifies nine critical Earth system processes that regulate the stability and resilience of the planet. These boundaries define a "safe operating space for humanity" within which human activities should remain to avoid catastrophic environmental change. The key boundaries include climate change, biosphere integrity, land-system change, and biochemical (Sidelko et al. 2019, Ignatowicz et al. 2021) flows (phosphorus and nitrogen cycles), among others (Rockström et al. 2009, Richardson et al. 2023). Recent updates to the planetary boundaries framework have highlighted that humanity has transgressed six out of the nine boundaries, significantly increasing the risk of triggering severe environmental and social consequences. For instance, the boundaries for climate change, biosphere integrity, land-system change, and novel entities, such as microplastics and other synthetic pollutants, have been exceeded, posing significant threats to global sustainability. The framework emphasizes the interconnectedness of these boundaries and the need for integrated approaches to manage human impacts on the Earth system. For example, the transgression of the biosphere integrity boundary is closely linked to the other boundaries due to its role in maintaining ecological balance and supporting biodiversity (Lade et al. 2021). The planetary boundaries framework serves as a critical tool for scientists, policymakers, and businesses to track environmental pressures and develop strategies for sustainability (Chamier-Gliszczyński 2012). By respecting these boundaries, humanity can work

towards a stable and resilient planet, ensuring long-term prosperity and equity. The framework has gained significant traction among international bodies and corporations, influencing global environmental policies and sustainable development practices (Rockström et al. 2019).

2.2.2. Efficiency and effectiveness in Sustainable Supply Chain Management

Efficiency in sustainable supply chain management (SSCM) refers to the ability of the supply chain to minimize waste (Chamier-Gliszczyński & Krzyżynski 2005) and resource usage while maximizing output. Efficiency is achieved when processes are optimized to use the least amount of resources necessary to produce the desired number of products. For instance, reducing energy consumption (Kuczynski et al. 2021, Kłodawski et al. 2024), lowering production costs, and minimizing material waste are all indicators of an efficient supply chain. Efficient supply chain practices are critical for sustainability as they reduce environmental impacts and improve operational performance (Touboulie 2016, Staniuk et al. 2022). Effectiveness in SSCM, on the other hand, is concerned with achieving the desired outcomes and meeting strategic goals. It involves ensuring that the supply chain not only operates efficiently but also aligns with the broader sustainability objectives of the organization. This means doing the right things, such as selecting environmentally friendly materials, adhering to ethical labor practices, and delivering products that meet customer expectations for sustainability. Effectiveness in supply chain management entails making decisions (Woźniak & Wojnarowski 2015, Woźniak et al. 2018) that contribute to long-term sustainability goals (Ho 2015). Furthermore, the importance of integrating both efficiency and effectiveness to achieve sustainable supply chain management is fundamental. A balance between the two ensures that supply chain activities are not only cost-effective but also contribute to the overall sustainability of the organization. While efficiency in SSCM focuses on minimizing resource use and waste, effectiveness is about achieving the right strategic outcomes. Both are essential for creating a supply chain that is operationally superior and aligned with sustainable development goals (Cee 2016).

2.2.3. Efficiency and effectiveness from WST perspective

The WST approach facilitates a systematic reconciliation of efficiency and effectiveness. Utilizing the RST (Reductionism Systems Thinking) approach, system components and their interactions are optimized to maximize overall performance, considering the system's objectives and customer satisfaction in terms of anticipated volumes. Maximum performance is quantified using an efficiency formula, dividing output by input (Fig. 3).

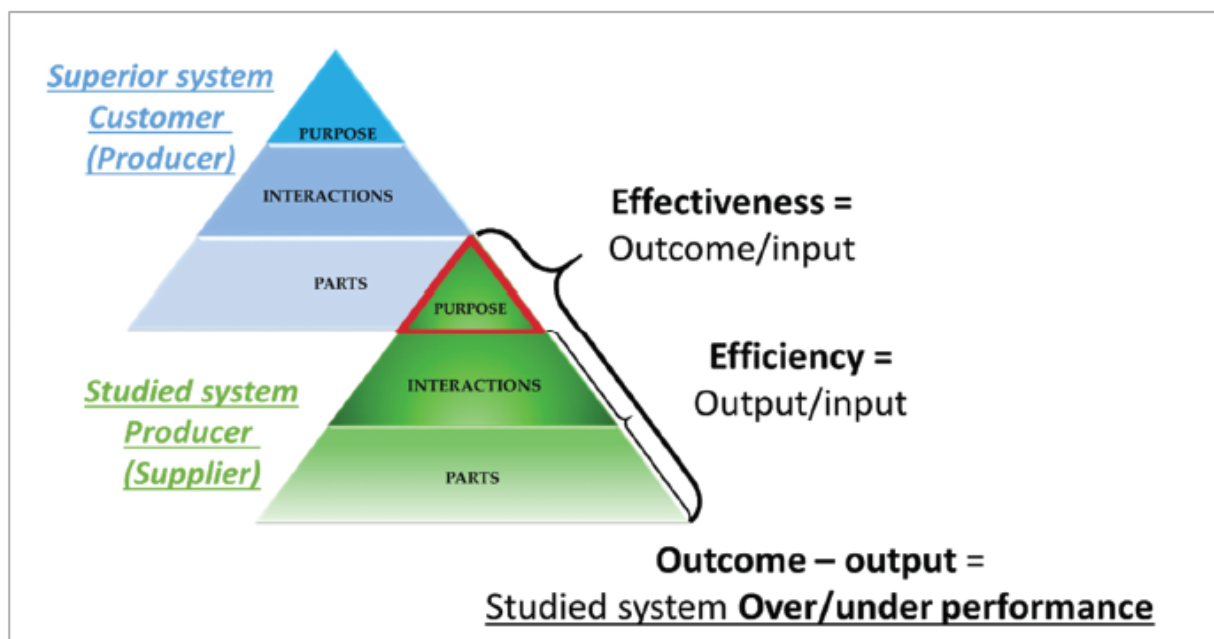


Fig. 3. WST enabling understanding of efficiency and effectiveness differences (Holman 2018)

The WST approach systematically considers the superior system by focusing on its primary purpose. The superior system's purpose, derived from the external environment perspective, is synthesized through the Wholeness Synthesis process. This process establishes purposeful limits for studied system components' performance and interactions. These limits determine the outcome within the effectiveness formula Outcome/Input (Holman 2018).

2.2.4. VUCA – reactive and proactive application

In the context of VUCA environments, organizations often adopt either reactive or proactive strategies to manage and respond to external pressures and changes.

In a reactive strategy, organizations typically respond to changes and pressures as they occur without prior planning or anticipation. This approach is often characterized by short-term solutions to mitigate immediate problems or risks. Reactive strategies can be less resource-intensive in the short term but may lead to increased costs or missed opportunities in the long run because they tend to be less prepared for future challenges (Bennett 2014).

Conversely, proactive strategies involve anticipating changes and challenges and planning responses ahead of time. This approach includes forward-thinking and strategic planning to handle current situations and set the stage for future success. Proactive organizations often invest in research, innovative practices, and continuous improvement to address potential issues before they become problematic preemptively. Such strategies are associated with long-term planning, resilience, and adaptability, often leading to better sustainability outcomes and competitive advantages. For instance, in manufacturing contexts, proactive companies tend to engage in practices that comply with existing standards and expectations and exceed them to foster environmental and social sustainability. These firms often achieve better performance in terms of sustainability because their proactive measures align with broader societal and environmental goals (Kaoutar 2022, Maćkowiak et al. 2023).

While reactive approaches might offer immediate solutions to challenges in a VUCA environment, proactive approaches provide a strategic advantage by anticipating changes and preparing accordingly. This strategic foresight is crucial in managing the complexities and uncertainties typical of VUCA contexts, ultimately leading to more sustainable and resilient organizational practices.

3. Research Design and Methodology

A new systematic methodology has been established for this article, which explores a unified approach to lifelong learning and human capital development within Sustainable Supply Chain Management. This methodology compares Knowledge-based and Understanding-based educational approaches identified within the 21st EWA Edu model. Additionally, both qualitative and quantitative research methods were utilized to assess the current situation in a studied automotive sector company.

3.1. Research in the company includes both quantitative and qualitative methods

Semi-structured interviews were selected as the research method. A qualitative empirical approach based on participants' observations and direct experiences was employed to assess the results of these interviews (Petrušek 1993). The interviews were conducted either in person or via Microsoft Teams video calls, lasting between 30 and 45 minutes, with one exception where the interview with the VP of Operations lasted 60 minutes. All interviews were recorded to ensure accuracy in the transcription of responses. Before each interview, participants were informed about its main purpose.

After transcription, the most relevant codes were identified based on the frequency of specific factors and the relevance of the information to the research objective. A total of 12 codes were derived for further transcription and analysis. These codes included: Supplier delivery security, Best cost, Meeting quality standards, Strategic supplier panel optimization, Internal alignment, Risk, EU management, Supplier management (including escalations), Operational cooperation (daily operations and escalations), Strategic cooperation, Communication, Understanding of Procurement responsibilities and contacts, and Directed buy.

During the interviews, additional ad-hoc questions were posed when deemed relevant. The predefined list of questions covered four main areas: Procurement's primary tasks, Cooperation with procurement, Opportunities for improving cooperation, and Additional comments.

3.2. Methodology applied in Case study

Knowledge-based education is responsible for confusion and misunderstanding, influencing the Understanding the reality. Knowledge-based education, based on the DIKW hierarchy, is studying reality without sufficient consideration of the external environment. Such an approach is responsible for the worldview that the world consists of disconnected systems, resulting in the assumption that better separated systems create a better world. Such an approach nourishes the Maximization mindset: the more, the better. The current and proposed Understanding-based education approach is structurally visible from a comparison of the DIKW hierarchy and the DIKHUW hierarchy, which is known from the 21st EWA Edu model. The methodology applied in this article consists of identifying and describing misunderstandings and differences in educational approaches resulting in learner's mindsets.

1. Comparative Analysis: Examining the differences between Knowledge-based and Understanding-based educational paradigms and their impact on learners' mindsets.
2. Identification and Description of Misunderstandings: Analyzing how traditional educational approaches contribute to misconceptions and fragmented worldviews when explaining the differences between knowledge and understanding and efficiency and effectiveness.
3. Case Study: Applying the theoretical framework to a practical case within 1st supplier at the automotive industry to demonstrate the effectiveness of the Purposeful mindset based on a new intellectual capacity Understanding of Wholeness.

This methodology aims to provide a comprehensive examination of educational approaches and their influence on Sustainable Supply Chain Management, respectively, on learners, including lifelong learners, ultimately advocating for a more wholistic (not only holistic) understanding of reality.

3.2.1. Difference of Knowledge-based and Understanding-based education

DIKHUW hierarchy applies two kinds of Understanding: Holistic Understanding and Understanding of Wholeness. Holistic Understanding is the description of understanding that is currently applied based on experiences. The new intellectual capacity, defined based on WST, is the understanding of applying the role of Purpose in any system creating the current world. The system's Purpose is defined by the relevant external environment by Wholeness Synthesis. Concretely, there are three steps: identification of the superior system, understanding the superior system, and identifying the purpose of the studied system within the external environment. Afterward, three steps of Wholeness Analysis are responsible for applying Purpose, coming from the relevant external environment into the performance of the studied system's parts and interactions.

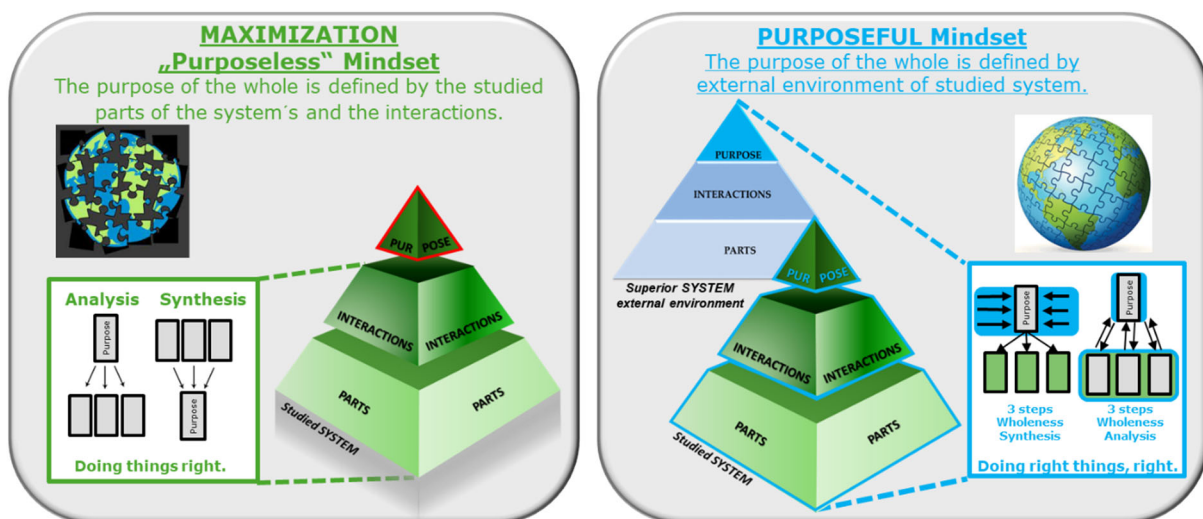


Fig. 4. DIKW in Maximization mindset vs DIKHUW in Purposeful Mindset (Holman et al. 2018)

It is in comparison with traditional analysis and synthesis, which is researching the properties of the system separately, without sufficient consideration of the external environment. The traditional analysis and synthesis are applied when defining Knowledge in DIKW pyramid. The Wholeness Synthesis and Analysis is applied when defining the Understanding of Wholeness, the new intellectual capacity, in DIKHUW pyramid (see Fig. 4).

3.2.2. Knowledge vs Understanding unconscious misunderstandings

Common misunderstandings about the concepts of "knowledge" and "understanding" often arise due to their overlapping but distinct meanings, especially in educational contexts.

A common unconscious misunderstanding is treating knowledge (the accumulation of information and facts) as the same as understanding (the comprehension and the ability to make sense of that knowledge). People often assume that if someone has knowledge of a subject, they also understand it, which is not always the case. It is often presumed that the more knowledge one has, the greater their level of understanding. However, understanding requires integrating and applying knowledge to new situations, which is a step beyond simply possessing information.

Many believe that understanding naturally follows knowledge acquisition, but understanding requires additional cognitive processes, such as reflection, analysis, and synthesis of information. Traditional views might see education's endpoint as acquiring knowledge rather than developing a deeper level of understanding.

There is an unconscious bias towards valuing the quantifiable aspects of knowledge over the qualitative aspects of understanding. People sometimes do not recognize the depth of understanding, mistakenly thinking it is enough to be able to repeat information. True understanding means being able to explain concepts in one's own words, apply them in various contexts, and connect them with other concepts.

Traditionally, education systems have been criticized for emphasizing the memorization of information at the expense of promoting the deep understanding of content. Students might be able to pass tests without truly understanding the material, leading to a misunderstanding of what it means to "know" something. Understanding is context-dependent, but there is an unconscious mistake to consider it as static as knowledge. Understanding evolves with experience and perspective, whereas knowledge can be seen as a collection of static facts.

There is a misunderstanding about how understanding develops. It is not instantaneous; it is a process that often involves making mistakes, asking questions, and challenging preconceived notions. Knowledge can be acquired relatively quickly, but understanding requires a deeper engagement over time. Often, understanding is seen as something that happens to us rather than something we actively do. In reality, understanding is an active process that involves engagement, curiosity, and often a hands-on approach.

Six mentioned examples describe the challenging situation in actual education and human capital development. The unconscious misunderstandings result from the current Maximization mindset based on the DIKW hierarchy. The currently applied Holistic Understanding, defined within 21st EWA Edu concretely Learning by studying the experiences, is based on accumulated experiences from previous generations (Holman 2023). Such an approach is irrelevant to the current VUCA environment, where there is no time to subject new information and knowledge to experience. Therefore, a new educational approach is needed, supported by understanding from systems thinking and guided by new intellectual capacity that respects 21st-century reality. In a short time, such an approach should be implemented in human capital development, andragogy, pedagogy, and the education of the young. Therefore, a unified educational approach that respects current worldwide reality is needed and applied to life-long learning (Holman 2023).

A wholistic understanding of the reality creating the external environment rather than holistic knowledge of all parts and interactions of disconnected systems is the new paradigm required in understanding the 21st-century reality, which needs to be supported by a transition from Knowledge-based education to Understanding-based education. Therefore, the emergent paradigm essential for comprehending 21st-century reality necessitates a Wholistic understanding. This perspective considers the world as a unified entity composed of interconnected systems whose performance is determined by the integrative properties of the external environment. This transition calls for a move from Knowledge-based education to Understanding-based education, enabling individuals to appreciate Purpose and integrate fragmented knowledge into a Wholistic understanding.

Table 1. Understanding of Wholeness preventing the misunderstanding between knowledge and understanding

WHOLENESS SYNTHESIS Three steps	WHOLENESS ANALYSIS Three steps
1. Identification of External Environment	1. Disassembling the System with Purpose
Prevents Misunderstanding: Encourages learners to place knowledge within a broader context, highlighting how external factors shape information.	Prevents Misunderstanding: Focuses on breaking down information with the overall goal in mind, maintaining the connection to the broader context.
Outcome: Helps students see the relevance and interconnectedness of facts, fostering a deeper understanding.	Outcome: Helps students understand each part's role within the whole, preventing fragmented learning.
2. Understanding of External Environment	2. Understanding Each Part and Interaction
Prevents Misunderstanding: Promotes comprehension of how different elements interact within a system, moving beyond isolated knowledge.	Prevents Misunderstanding: Emphasizes the relationships between components, fostering a more integrated view.
Outcome: Facilitates wholistic thinking and the ability to connect disparate pieces of information.	Outcome: Promotes deeper insights into how parts influence each other and contribute to the system's function.
3. Defining the Purpose	3. Completing the Understanding of the System
Prevents Misunderstanding: Ensures that learning is goal-oriented, with a clear purpose guiding the acquisition and application of knowledge.	Prevents Misunderstanding: Involves synthesizing insights to form a comprehensive understanding, moving beyond rote memorization.
Outcome: Encourages learners to reflect on the "why" behind the information, deepening their understanding.	Outcome: Enables students to apply knowledge in various contexts, demonstrating true understanding.

By adopting an Understanding-based approach supported by Wholeness Synthesis and Analysis, education can shift from merely transmitting information to fostering a deeper, more integrated, and purposeful knowledge comprehension. This approach helps eliminate common misunderstandings by promoting a wholistic, context-aware, and actively engaged learning process.

4. Analysis of a Specific Case Study

The company being researched has a history spanning over 140 years in the global automotive industry. It operates as a TIER 1 supplier, providing products and services to all major OEM car manufacturers in key markets worldwide. With an average annual revenue of €7 billion and a workforce of 25,000 employees, the company communicates its purpose through its vision, mission, and corporate values. The overarching message highlights the company's commitment to making future mobility lighter, safer, and more sustainable. The company's vision outlines its goals for 2025: to emerge from challenges such as COVID-19, semiconductor shortages, and inflation as a financially stable, highly competitive, and agile Metal Processing Specialist. The company aims to secure a profitable and sustainable growth trajectory, outperforming the market. Its strong financial performance will enable it to control its future, and it is dedicated to developing solutions that make a meaningful impact on customers, employees, and society.

The company's mission emphasizes its dedication to making a difference through expertise and innovative metal forming and processing solutions for the automotive, industrial, and energy sectors. Its corporate values—Courage, Ambition, and Respect—are central to its operations. Courage involves exploring new paths with curiosity and taking responsibility for decisions. Ambition reflects the pursuit of excellence every day, and Respect is about fostering collaboration through open, honest communication and mutual appreciation (Hand'ák 2022).

4.1. Overview of the Company's Current Supply Chain Management Situation

The current company processes tend to foster a siloed approach, where each department operates independently. Departments establish their own Key Performance Indicators (KPIs) and goals, which are monitored separately, as illustrated in Fig. 5. This structure limits the company's ability to adapt quickly when external circumstances shift, which is particularly concerning in today's volatile, uncertain, complex, and ambiguous (VUCA) environment, where change is inevitable (Gao 2021). Often, departmental KPIs conflict with one another, as each department remains narrowly focused on achieving its own objectives, sometimes with separate financial reporting structures. This leads to different data sets being presented for the same critical issues, causing delays in reaching consensus on fundamental matters that should ideally be automatic. As a result, internal audits become necessary, though these could be reduced with better alignment.

In many cases, departmental goals are not fully aligned with the company's overall mission, vision, and values. Research indicates a lack of awareness regarding systemic thinking within the organization. Interview responses often reveal that employees overlook the perspectives of other departments. When asked how collaboration between their department and procurement could be improved, over 50% of responses focused solely on the department's own viewpoint, emphasizing what procurement should change or improve. Although the company's mission, vision, and values are clearly defined and accessible to employees, there is limited familiarity with them, and their integration into daily activities is not consistently evident.

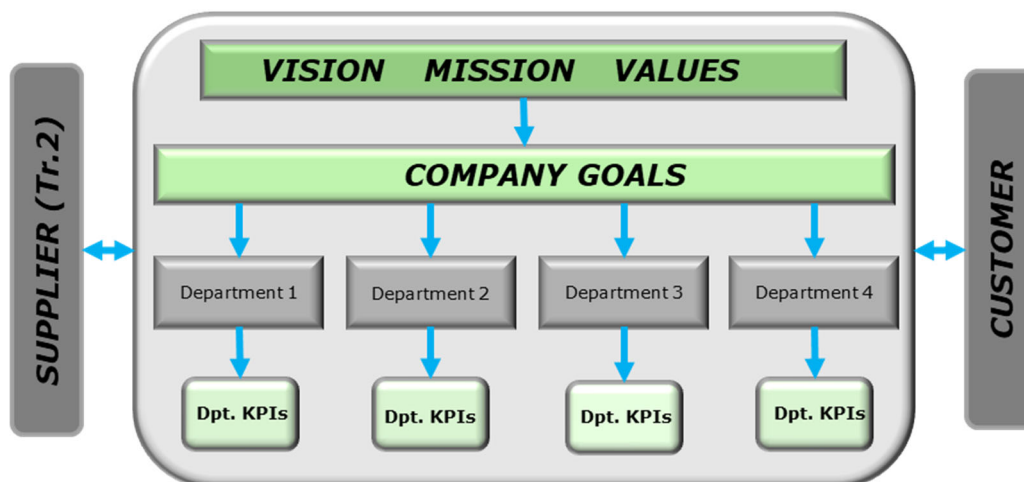


Fig. 5. DIKW and Maximization mindset in SSCM (adjusted from Hand'ák 2022)

Figure 5 illustrates that the company prioritizes strict adherence to financial budgets and rule compliance above all else. Decision-making is often driven by a short-term focus, heavily influenced by the company's financial structure. Typically, if an expense wasn't included in the budget, it rarely receives approval. This "it's not in the budget" mentality limits flexibility in collaboration and stifles innovation. Departments that manage to stay within their budgets are often regarded as successful, without much consideration given to questions like, "Was the budget properly prepared?", "Did it account for all necessary factors?", or "Should we adjust our approach due to changes in the market since the initial planning?" (Hand'ák 2022).

4.2. Proposed Transformation of SSCM in the Company – Within the Traditional Framework of the Knowledge-Based Approach to Understanding Reality

For example, a company that produces a certain number of products with minimal waste and low production costs can be deemed efficient. However, effectiveness focuses on whether the goals and tasks set are relevant and meaningful in the context of the broader organizational or individual objectives. It assesses whether the right tasks are being pursued, making effectiveness about "doing the right things."

Workplace Systems Thinking (WST) can potentially drive a purposeful mindset shift within an organization. This approach encourages a holistic view of the company's mission, vision, and values, moving away from isolated departmental goals and towards a collective understanding of the organization's overall purpose. It prompts employees at all levels to reflect on fundamental questions like "Why does the company exist?" and "What is needed to ensure its long-term sustainability?" This introspection fosters a stronger connection to the company's mission and values, creating a shared sense of purpose among employees. It ensures that the company's objectives extend beyond profit to include its societal and environmental impacts, imbuing daily work with a sense of responsibility and meaning (Holman & Švejdarová 2023).

WST also promotes collaborative alignment across departments, breaking down silos and encouraging a systems-thinking approach to problem-solving. Integrating different functions and enhancing communication makes the organization more adaptable to changing external conditions and disruptions (Christopher 2014). This empowers employees to recognize the interconnectedness of their actions and understand how they contribute to the company's broader goals. The outcome is a purposeful mindset that prioritizes value creation for both internal and external stakeholders, strengthening the company's ability to navigate the complexities of the modern business environment with a unified sense of purpose, as illustrated in Figure 6.

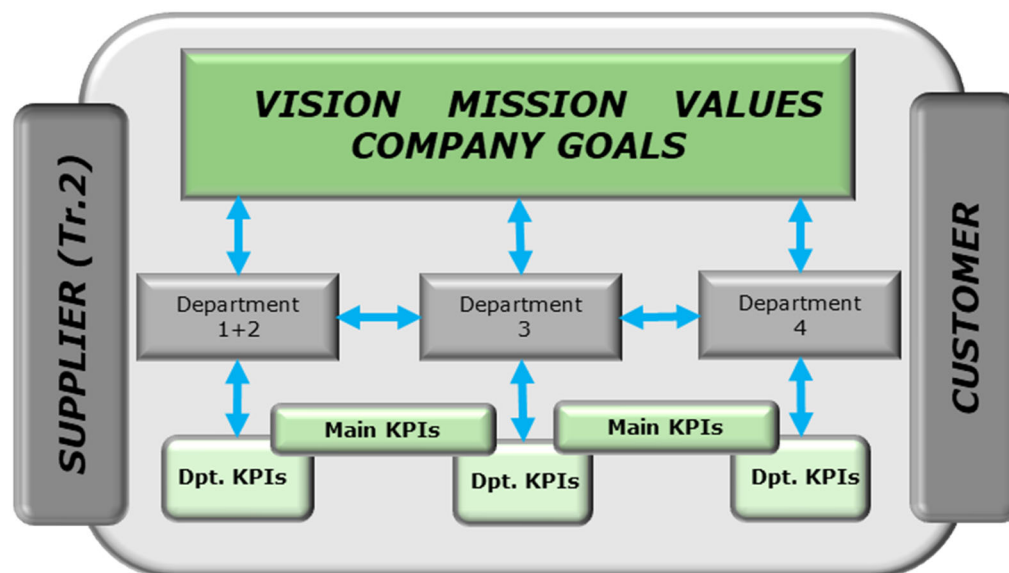


Fig. 6. WST approach integrating the organization and KPIs (adjusted from Hand'ák, 2022)

When considering systems thinking in redesigning the company's structure, there are clear advantages to merging two or more departments to improve communication, align priorities, and enhance value generation at supplier facilities. For instance, the Supplier Quality Engineering (SQE) department could be combined with procurement, and this potential for integration could be extended further. The logistics department, which plays a key role in procurement by managing the flow of materials from suppliers to end customers, could also be merged with procurement to streamline operations.

To further refine this proposed design, it is essential to reconsider the logic behind the KPI definition. The proposal includes two types of KPIs. Main KPIs are mandatory and must be achieved by multiple departments, as illustrated in Fig. 6. This approach reduces conflicts between departments regarding KPI priorities. Sub KPIs, on the other hand, are department-specific due to their unique tasks. Notably, Sub KPIs can be adjusted to provide flexibility when responding to changing circumstances, while Main KPIs remain constant to ensure sustainable commitment and alignment across departments.

Another critical aspect of applying systems thinking in the new model is improving information exchange with suppliers and customers. Unlike the current approach, it is strongly recommended that strategies and commitments communicated to suppliers are first aligned with customers. Although this may seem less flexible, ensuring that information is consistent among suppliers, customers, and the company enhances its quality, reduces the need for repetition or corrections, and ultimately conserves resources.

Additionally, two-way communication is essential throughout the design process (Kotter 1999). Employees at all levels, from entry-level staff to senior management, should communicate openly and consider input when making decisions. KPIs should be defined through departmental agreements, departments should maintain ongoing communication, and company goals should be established through both top-down and bottom-up input. Furthermore, the company's vision should incorporate department and customer feedback to ensure alignment.

4.3. Proposed change of SSCM in the company – within the proposed environment of the Understanding-based approach in the understanding of reality

In today's rapidly evolving business landscape, the importance of SSCM cannot be understated. As organizations strive to meet environmental, social, and economic responsibilities, the dual imperatives of effectiveness and efficiency become critical pillars of SSCM. This chapter dives into the educational frameworks that underpin Understanding-based approaches to SSCM, highlighting how they clarify the intricate balance between maintaining sustainability and achieving purposeful performance. By exploring the integration of effectiveness and efficiency within SSCM, we aim to provide a comprehensive view of how these principles drive sustainable practices and foster long-term success in supply chain operations. Through a detailed examination of educational approaches and models, the 21st EWA Edu, this chapter will illustrate the significance of WST in cultivating lifelong learning, therefore, current and the next generation of supply chain professionals equipped to navigate the complexities of a VUCA world.

4.3.1. Efficiency and Effectiveness Misunderstandings and consequences

When management does not adequately distinguish between efficiency and effectiveness, several adverse consequences can arise, affecting various aspects of organizational performance and strategic direction. Here are some common consequences.

Misaligned Priorities: Companies might focus excessively on doing things right (efficiency), at the expense of doing the right things (effectiveness). This can lead to scenarios where resources are perfectly optimized to deliver outputs that do not align with the company's strategic goals or market needs.

Resource Misallocation: Organizations may misallocate resources without a clear understanding of the difference between efficiency and effectiveness. For example, they might invest heavily in technology to speed up production without considering whether these investments contribute to producing the right products or meeting customer expectations.

Reduced Innovation: Focusing purely on efficiency can discourage innovation, as new and innovative processes often require an initial decrease in efficiency. This can cause companies to miss opportunities for product development or market expansion that could have driven long-term growth.

Sustainability Issues: If a company focuses solely on efficiency, it might overlook the broader impacts of its operations on the environment, society, and even its workforce. This can lead to unsustainable practices that damage the company's reputation and lead to long-term financial liabilities.

Employee Burnout: An overly efficiency-driven approach can lead to employee burnout, as workers are pushed to maximize output without sufficient regard for work-life balance or job satisfaction. This can reduce overall effectiveness as employee morale and productivity decline.

Customer Dissatisfaction: If effectiveness in meeting customer needs is overlooked in favor of efficiency, the result can be products or services that do not fully meet customer expectations, leading to dissatisfaction and loss of market share.

Inflexibility and Lack of Responsiveness: Companies that do not balance efficiency with effectiveness may become inflexible and unable to adapt to changes in the marketplace. This can slow them to respond to new customer demands, technological changes, or competitive pressures.

Strategic Shortcomings: Overemphasis on operational efficiency might lead to a neglect of strategic planning and development. This could hinder the company's ability to foresee future challenges or opportunities, limiting its strategic agility and potential for growth.

To avoid these consequences, management must recognize that while efficiency is important for optimizing resources, effectiveness is critical for ensuring that the organization's efforts are aligned with its overall goals and objectives. Effective management should strive to maintain a balance where operational efficiencies support the organization's strategic objectives, thereby ensuring both immediate and long-term success.

In the context of comparing Knowledge-based and Understanding-based educational approaches, it is essential to move beyond merely defining terms separately (as a knowledge-based approach does) to exploring their applications and interactions within a changing external environment. This deeper exploration is the evidence of an Understanding-based approach, which seeks to develop an understanding of the wholeness and interconnectedness of these concepts in reality.

The core issue is not simply defining efficiency and effectiveness in isolation but examining how they interact and manifest in real-world scenarios. This approach emphasizes understanding the broader consequences of these interactions, particularly in dynamic environments. The critical challenge arises when an excessive focus on efficiency defends achieving greater effectiveness, representing a fundamental misunderstanding. Recognizing efficiency's limits and balancing them with effectiveness is crucial for integrating sustainability into practice.

The Knowledge-based education approach, which emphasizes the accumulation of knowledge through traditional holistic analysis and synthesis methods, fails to adequately consider the importance of purposeful limits that prevent infinite growth. These limits, defined by purpose—a system's element from the WST perspective—are more effectively integrated in Understanding-based education. A top-performing company is not simply a collection of the best possible departments and their interactions, which characterizes the holistic approach. Rather, it is defined by the whole, with its quality shaped by the external environment, embodying a wholistic approach. This wholistic quality is often articulated in a company's strategic documents, such as its mission, vision, and values. Once these are properly defined from a broader perspective, the next step is to apply them directly to the company's daily operations, establishing purposeful limits. This systematic, interrelated approach—specified in the three steps of Wholeness Synthesis and the three steps of Wholeness Analysis—is crucial for achieving a company's sustainable goals with the appropriate allocation of resources.

4.3.2. The role of Understanding-based educational approach in unifying unconscious misunderstandings of efficiency and effectiveness in SSCM

When applying the innovations in Sustainable Supply Chain Management, educational approaches and lifelong learning need to be aware of complications resulting from current Knowledge-based education and Maximization mindset. The new, Understanding-based education, enabling a Purposeful mindset, structurally explains the difference and considers the consequence of mutual interactions within a changing environment.

Effectiveness: In contrast to the DIKW hierarchy, effectiveness in the DIKHUW model is deeply integrated with the Understanding of Wholeness. This involves the Identification of Superior System: Recognizing the larger system to which the studied system belongs. Understanding of Superior System: Comprehending the dynamics and purposes of this larger system. Identifying the Purpose of the Studied System: Defining the system's purpose within the context of the external environment. These steps ensure that effectiveness considers the external environment, aligning the system's goals with broader ecological, social, and economic systems. This approach allows for a more comprehensive understanding of effectiveness, ensuring that actions are purposeful and sustainable. By incorporating WST, the DIKHUW hierarchy provides a more wholistic and sustainable approach to understanding efficiency and effectiveness, ensuring that systems are optimized internally and aligned with broader environmental and societal goals.

Efficiency: In the DIKHUW model, efficiency remains a measure of internal optimization (output/input), but Understanding of Wholeness enriches it. This means efficiency is evaluated through internal metrics and an understanding of how these metrics fit within a superior system, external environment context.

To address the unconscious confusion between efficiency and effectiveness in companies from an Understanding-based perspective utilizing Wholeness Synthesis and Wholeness Analysis, SSCM managers must align company priorities with strategic goals, market needs, and planetary boundaries, as presented in Table 2.

Table 2 highlights the step-by-step three steps of Wholeness Synthesis and Wholeness Analysis defined by Understanding of Wholeness, emphasizing their focus on identifying the larger context, understanding market dynamics, defining purpose, aligning departmental goals, facilitating cross-functional collaboration, and maintaining continuous improvement and adaptability. Moreover, Fig. 7 illustrates the integrative approach within the case study, demonstrating how the external environment requirements specified by company stakeholders

are aligned with operational activities. These activities are subsequently measured by relevant integrative KPIs, ensuring comprehensive evaluation and alignment. The urgency of sustainability is underscored by the increasing pressure of planetary boundaries, emphasizing the critical need for a purposeful approach and collaborative efforts. This approach necessitates integrating sustainable practices into core operations and fostering cooperation among all stakeholders to effectively address environmental challenges and achieve a long-term wise balance of sustainable dimensions.

Table 2. Understanding of Wholeness unifying the role of efficiency and effectiveness in SSCM

EFFECTIVENESS Wholeness Synthesis (three steps)	EFFICIENCY Wholeness Analysis (three steps)
1. Identification of Superior System:	1. Application of Purpose to the Performance of Parts:
Define the External Environment: Identify the larger context within which the company operates, including market trends, industry standards, customer, environmental, social needs, and competitive landscape.	Align Department Goals: Ensure each department's goals align with the company's overall purpose. This means revisiting and adjusting departmental KPIs to balance efficiency with strategic effectiveness.
Benchmarking: Compare the company's performance with leading organizations in the industry to understand the standards of effectiveness and efficiency.	Resource Allocation: Allocate resources based on strategic priorities. This might involve shifting resources from areas of high efficiency but low strategic impact to areas of higher strategic importance.
Stakeholder Analysis: Determine the key stakeholders (customers, employees, shareholders, regulatory bodies, SDG's) and their expectations.	
2. Understanding the Superior System:	2. Application to Interactions:
Market Research: Conduct comprehensive market research to understand the needs, preferences, and behaviors of the target audience.	Cross-functional Collaboration: Promote collaboration between departments to ensure that efficiency improvements in one area do not negatively impact the effectiveness of another.
Competitive Analysis: Analyze competitors to understand their strategies, strengths, and weaknesses.	Communication Channels: Establish clear communication channels to ensure that changes in strategy or market conditions are quickly and effectively communicated across the organization.
Trend Analysis: Identify industry trends and emerging technologies that could impact the company's operations and market positioning.	
3. Identifying the Purpose of the Studied System:	3. Continuous Improvement Based on External Environment:
Define the Company's Purpose: Clarify the company's mission, vision, and strategic goals. Ensure these align with the needs and expectations of the external environment.	Feedback Loops: Create feedback loops with customers and other stakeholders to ensure that the company's outputs remain relevant and aligned with market needs.
Purpose-Driven Goals: Set clear, purpose-driven goals that reflect both effectiveness (how well the goals are achieved) and efficiency (how well resources are used).	Adaptability: Develop the ability to quickly adapt to changes in the external environment. This includes regular reviews of strategy and performance metrics to ensure ongoing alignment with the company's purpose.

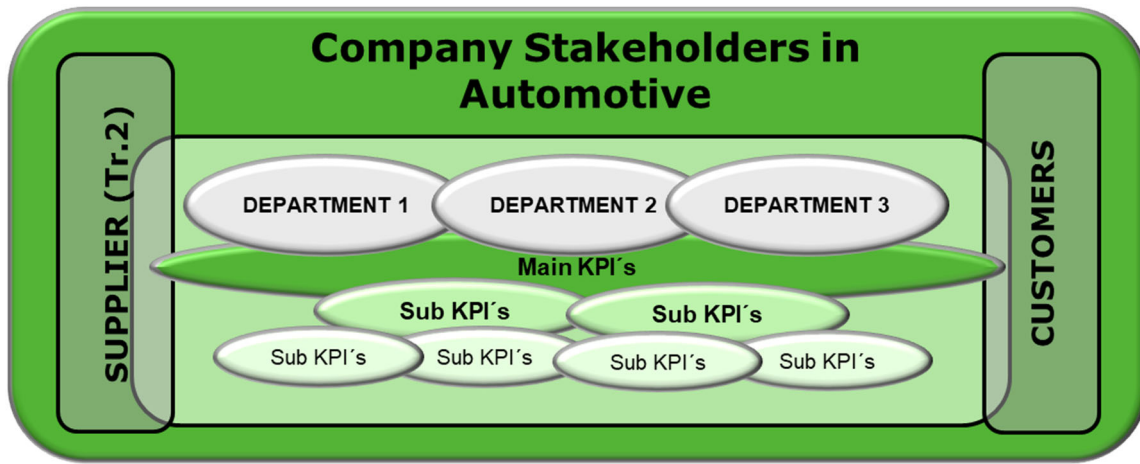


Fig. 7. Understanding-based approach aligning stakeholder requirements, company strategy into operational level

SSCM requires effectiveness supported by a systematic consideration of the external environment and an understanding of the role of the system's purpose for the performance of studied systems' parts and interactions. Understanding-based approach recognizing the importance of Purpose coming from understanding the external environment including social and environmentally sustainable dimensions enables the integration of the companies' departments and aligns them purposefully with the companies' strategy. Fig. 7 visualizes the systematic implementation of the company's mission, vision, values, and goals previously derived from the company's stakeholders. Furthermore, it visualizes the KPIs, which must transform companies' goals into sustainable operational performance. The visualization demonstrates that a company and its partners are not simply a collection of the best possible parts and interactions but rather a unified whole. In this unified system, an understanding-based wholistic perspective, which includes the external environment, is integrated into the daily operations of a sustainable supply chain.

4.3.3. Understanding-based approach in dealing with the VUCA environment

VUCA, an acronym for Volatility, Uncertainty, Complexity, and Ambiguity, describes the challenging and dynamic conditions modern organizations face. Volatility refers to the rapid and unpredictable changes in the environment. Uncertainty indicates the difficulty in forecasting future events. Complexity denotes the intricate interdependencies within systems and markets. Ambiguity captures the unclear and often misleading nature of information. Originally a military term, VUCA is now widely used in business and strategic management to help organizations navigate these multifaceted challenges (Table 3).

Table 3. VUCA in Knowledge-based and Understanding-based approach

Aspect	Knowledge-based Approach (Analysis and Synthesis)	Understanding-based Approach (Wholeness Synthesis and Analysis)
Volatility	Focuses on gathering and analyzing data to predict and manage rapid changes.	Emphasizes creating a Vision that aligns with core values and long-term objectives, providing a stable direction amidst changes.
Uncertainty	Relies on accumulating knowledge and information to reduce uncertainty.	Promotes Understanding by identifying and interpreting external factors, recognizing their potential impact on the organization.
Complexity	Breaks down complex systems into simpler parts to analyze and manage interactions.	Uses Clarity to integrate diverse information, ensuring a comprehensive view of how various elements interact within the whole system.
Ambiguity	Attempts to clarify ambiguity through detailed analysis and precise data interpretation.	Adopts Agility, enabling flexible and adaptive responses to ambiguous situations through a purpose-driven and wholistic perspective.

Based on Understanding-based approach the new meaning for VUCA letters could be proposed.

Vision: Establishes a clear vision that provides direction and purpose, helping the organization navigate through volatile conditions with a focus on long-term goals. **Understanding:** Prioritizes a deep understanding

of the external environment, integrating social and environmental dimensions to anticipate and adapt to uncertainties. **Clarity:** Maintains clarity by synthesizing diverse information, ensuring that all parts of the system are understood within the context of the whole, leading to better decision-making in complex situations. **Agility:** Emphasizes agility by fostering a flexible mindset and adaptive strategies, allowing the organization to respond swiftly and effectively to ambiguous and unpredictable scenarios.

By adopting an Understanding-based approach with Wholeness Synthesis and Wholeness Analysis, organizations can effectively transform the challenges of VUCA (Volatility, Uncertainty, Complexity, Ambiguity) into opportunities for growth and innovation through Vision, Understanding, Clarity, and Agility. This shift enables a more integrated, purposeful, and adaptive response to the unpredictable not only business environment of the 21st century.

5. Conclusion and Recommendation

The 21st century automotive industry is navigating an unprecedented and challenging environment characterized by rapid technological advancements, stringent environmental regulations, and shifting consumer preferences. The convergence of electric vehicle (EV) innovation, autonomous driving technology, and the demand for sustainable practices has compelled industry players to adapt swiftly to remain competitive. Moreover, the global supply chain disruptions and the economic impacts of recent global events, such as the COVID-19 pandemic, have further intensified the need for resilience and agility. This complex landscape requires automotive companies to leverage advanced technologies and develop strategic foresight and flexible operational capabilities to thrive in an era marked by VUCA (volatility, uncertainty, complexity, and ambiguity).

Due to several key factors, the VUCA environment poses significant challenges for traditional knowledge-based education supporting Maximization mindset. Traditional education often focuses on accumulating and recalling static information, which quickly becomes outdated in a world characterized by fast-paced technological advancements and shifting market conditions. This approach tends to compartmentalize subjects and emphasize isolated facts, whereas navigating a VUCA environment requires an integrated understanding of complex, interconnected systems. Traditional models are typically based on predictable outcomes and linear progression, which do not align with the inherently unpredictable nature of VUCA environments. Furthermore, traditional education emphasizes recalling information rather than the development of critical thinking and problem-solving skills, which are essential for analyzing complex situations and developing innovative solutions in a VUCA world. The teacher-centric model of traditional education, where knowledge is transferred from instructor to student, contrasts with the learner-centric approaches needed in VUCA conditions. These approaches encourage learners to take ownership of their learning, engage in self-directed inquiry, and collaborate with others. Finally, the fixed curriculum of traditional education is often inflexible and slow to adapt to new developments, whereas VUCA environments demand an adaptive learning approach that is responsive to emerging trends, technologies, and skills requirements, enabling learners to stay relevant and effective in their fields.

The article introduces the 21st EWA Edu model, which advocates for a transformative approach to learning specifically designed to tackle societal challenges, highlighting sustainability. It systematically contrasts the traditional Knowledge-based educational model, grounded in the DIKW hierarchy, with the proposed Understanding-based educational model, outlined in the DIKHUW hierarchy from 21st EWA Edu model. This new model emphasizes systems thinking, distinguishing between reductionist approaches, rooted in traditional analysis and synthesis, and innovative WST, which leverages Wholeness Synthesis and Wholeness Analysis into the new intellectual capacity, Understanding of Wholeness.

Presented educational approaches are applied to highlight the differences between knowledge and understanding and between efficiency and effectiveness. A case study from a first-tier automotive supplier illustrates the practical challenges in strategic SSCM. Semi-structured interviews with managers reveal issues such as departmental isolation, misaligned KPIs and goals, and a lack of coherence with the company's mission, vision, and values. These issues stem from a traditional worldview that organizes companies into isolated silos, aiming to maximize performance and minimize unit costs, an approach nurtured by the Knowledge-based education described by the DIKW hierarchy.

In contrast, the Understanding-based educational approach, built on the higher intellectual capacity Understanding of Wholeness, employs WST. This perspective underscores the importance of the system's Purpose, enabling adaptation to external changes and enhancing the performance of the system's components and interactions. The benefits of a more coherent educational approach, resulting in a Purposeful mindset, are introduced when the difference between efficiency and effectiveness is unified and the misunderstanding between terms is clarified.

The core issue is not merely defining efficiency and effectiveness separately but understanding how they interact and manifest in practical contexts. When departments and companies are managed as isolated silos with independent KPIs, efficiency often dominates their activities. This focus on efficiency can disconnect individual performance from strategic goals, diminishing the company's or supply chain's overall effectiveness. Therefore, establishing purposeful limits on departmental efficiency and prioritizing effectiveness over efficiency becomes crucial.

Rather than an isolated approach, a more interrelated approach from Understanding of Wholeness intellectual capacity consisting of Wholeness Synthesis and Wholeness Analysis is presented. Knowledge-based education, which focuses on increasing knowledge through traditional holistic, analysis, and synthesis methods, often fails to appreciate the value of Understanding-based education. Understanding-based education introduces the power of Purpose, particularly in defining purposeful limits from a WST perspective. In contrast to the holistic approach, which seeks to optimize individual departments and their interactions, the successful company is defined by its overall wholistic quality, which is determined from the external environment. This wholistic quality is typically articulated in a company's strategic documents, such as its mission, vision, and values. When these elements are properly defined, the next step involves integrating them into the company's daily operations by setting purposeful limits. This systematic, interconnected approach ensures that the company's goals are achieved using a purposeful number of resources, thereby enhancing overall sustainability effectiveness. Similar benefits could be expected when dealing with the VUCA environment not only as a challenge but rather as an opportunity to change and succeed.

Being aware of the misunderstanding between knowledge and understanding, efficiency and effectiveness is a crucial assumption and purposeful motivation to successfully replace Knowledge-based education with Understanding-based education across pedagogy, andragogy, and lifelong learning. The rapid pace of change amplifies the need for transformation in the education of younger generations and lifelong learning for the active workforce. Our future depends on our ability to reflect VUCA's changing conditions in our daily lives, both professional and personal. Reaching the planet's limits mandates that we consider both economic but also environmental, and social aspects of sustainability. Shift from content-heavy curricula to those emphasizing critical thinking, problem-solving, and applying understanding rather than just knowledge in real-world contexts. Integrate Understanding of Wholeness to enhance an interdisciplinary approach. Include project-based learning and case studies that require students to apply understanding to solve complex problems, reflecting real-life scenarios. Embed the understanding of Purpose within the curriculum, encouraging and engaging learners to see the relevance of what they are learning and how it connects to broader societal and environmental goals.

The fast pace of change necessitates this shift not only for the education of younger generations but also for ongoing learning within the active workforce. Recognizing the distinction between knowledge and understanding, as well as efficiency and effectiveness, is essential for transitioning from Knowledge-based education to Understanding-based education in pedagogy, andragogy, which needs to be transformed into and lifelong learning. Our future depends on our ability to adapt to VUCA conditions in our professional and personal lives. As we reach the planet's limits, it is imperative to consider the economic, environmental, and social aspects of sustainability. This requires moving from content-heavy curricula to those that prioritize critical thinking, problem-solving, and applying coherent understanding rather than isolated knowledge in real-world contexts. Interdisciplinary approaches equipped with purposeful insight should be integrated to foster a Wholistic understanding. Incorporating project-based learning and case studies allows lifelong learners to apply their understanding to solve complex problems, mirroring real-life situations.

Incorporating a sense of purpose that unifies the learning process into understanding within lifelong learning engages learners by helping them grasp the relevance of their education and its connection to broader societal and environmental objectives.

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