



Course Specification

Course Code: PIM9104 Knowledge-based Economy Social Management
Management Innovation Program, College of Innovation and Management,
Suan Sunandha Rajabhat University Semester 1, Academic Year 2025

Section 1 General information

1. Course code and name

Course code	PIM ๙๑๐๔
ชื่อรายวิชาภาษาไทย	การจัดการสังคมเศรษฐกิจฐานความรู้
English	Management of Knowledge-Based Economic Society

2. Number of credits 3(3-0-9)

3. Course curriculum and types

3.1 Curriculum Doctor of Philosophy

3.2 Type of subject Core subject

4. Responsible teacher and instructor

4.1 Teacher in charge of the subject Assoc. Professor Dr. Kuncharee Kakhai

4.2 Instructor Assoc. Professor Dr. Kuncharee Kakhai

5 Contact Location E – Mail kuncharee.ka @ssru.ac.th

6. Semester / Year of Study

6.1. Semester 1/ 2025

6.2 Approximately 20 students are eligible.

7. Pre-requisite No

8. Co-requisites No

9. Classroom: Building 37, Innovation and Management Building, 2nd floor

10. Date of preparation or revision: June 1, 2025

Latest course details

Section 2 Objectives and objectives

1. จุดมุ่งหมายของรายวิชา

1.1 ออกแบบโมเดลในการพัฒนาสังคมเศรษฐกิจฐานความรู้ของประเทศไทย โดยบูรณาการทฤษฎี หลักการจัดการความรู้ การศึกษา นวัตกรรม ความคิดสร้างสรรค์ และกรณีศึกษา เพื่อให้สอดคล้องกับบริบทของประเทศในปัจจุบันและอนาคต

1.2 พัฒนาแนวทางปฏิบัติเชิงยุทธศาสตร์เพื่อส่งเสริมสังคมเศรษฐกิจฐานความรู้ในระดับองค์กรหรือระดับประเทศ โดยใช้ทักษะ การปฏิบัติงานอย่างสร้างสรรค์ มีการผสมผสานความรู้ เทคโนโลยี การจัดการความรู้ และการมีส่วนร่วมของผู้มีส่วนได้ส่วนเสีย

1.3 แสดงออกถึงคุณค่าและจริยธรรมในกระบวนการพัฒนาสังคมเศรษฐกิจฐานความรู้ โดยมุ่งประโยชน์ส่วนรวม ความยั่งยืน ความโปร่งใส และความรับผิดชอบต่อสังคม พร้อมถ่ายทอดแนวคิดดังกล่าวสู่การปฏิบัติในชีวิตจริงหรือในบทบาทวิชาชีพ

1.4 พัฒนาคุณลักษณะของพลเมืองในศตวรรษที่ 21 โดยยึดหลักคุณธรรม จริยธรรม การคิดเชิงระบบ ความคิดสร้างสรรค์ การทำงานร่วมกับผู้อื่น และความรับผิดชอบต่อสังคม เพื่อนำไปสู่การมีส่วนร่วมอย่างสร้างสรรค์ในการพัฒนาสังคมเศรษฐกิจฐานความรู้ของประเทศอย่างยั่งยืน

Course Objectives

1.1 Design a model for the development of a knowledge-based economy in Thailand by integrating theories, principles of knowledge management, education, innovation, creativity, and case studies to be consistent with the current and future contexts of the country.

1.2 Develop strategic practices to promote a knowledge-based economy at the organizational or national level by using creative work skills, integrating knowledge, technology, knowledge management, and stakeholder participation.

1.3 Demonstrate values and ethics in the process of developing a knowledge-based economy, focusing on public benefits, sustainability, transparency, and social responsibility, and convey such concepts into real-life practice or professional roles.

1.4 Develop characteristics of citizens in the 21st century by adhering to the principles of morality, ethics, systematic thinking, creativity, working with others, and social responsibility in order to lead to creative participation in the sustainable development of the country's knowledge-based economy.

2. Objectives of course development/improvement

According to academic progress in the scope of knowledge-based social management

Section 3 Characteristics and operations

1. คำอธิบายรายวิชา

(ภาษาไทย) ทฤษฎีและหลักการของสังคมเศรษฐกิจฐานความรู้ และทิศทางพัฒนาของประเทศ เสาหลักสำคัญของสังคมเศรษฐกิจฐานความรู้ การจัดการความรู้ การจัดการศึกษาและการฝึกอบรม ความคิดสร้างสรรค์และความคิดวิจารณ์ญาณ และนวัตกรรมแบบเปิด การประเมินสถานะของสังคมเศรษฐกิจฐานความรู้ กรณีศึกษาของต่างประเทศและในประเทศ

(ภาษาอังกฤษ) Theories and principles of knowledge-based economic society and development directions of the country; Principle pillars of knowledge-based economic society; Knowledge management; Educational Management and Training; Creativity and critical thinking and open innovation; Assessment of the state of knowledge-based economic society; Case studies from foreign countries and in the country.

2. Number of hours used per semester

Lecture (hours)	Tutoring (hours)	Practical training/work Fieldwork/internship(hours)	Self-study (hours)
๔๕ hours/semester	-	๓0 hours/semester	1๕ hours/semester

3. Number of hours per week that the teacher provides individual academic advice and guidance to students.

- 3.1 Consult in person at the lecturer's room, College of Innovation and Management
- 3.2 Consult via work phone/mobile number 083-494-3556
- 3.3 Consult via e-mail (E-Mail) kuncharee.ka @ssru.ac.th
- 3.4 Consult via social networks (Facebook/Twitter/Line) Create a LINE group for work consultation
- 3.5 Consult via computer network (Internet/Web board) As needed

Sector 4 Development of student learning outcomes

1. Morality and ethics

1.1 Morality and ethics that need to be developed

- (๑) Recognize the value of sacrifice and honesty.
- (๒) Be disciplined, punctual, and responsible towards yourself and society.
- (๓) Have leadership and follower skills, can work as a team and can resolve conflicts and prioritize.
- (๔) Respect the rights and listen to the opinions of others, including the value and dignity of being human.
- (๕) Respect the rules and regulations of the organization and society.

- (๖) Able to analyze the impact of knowledge use in academic and professional fields on individuals, organizations and society as a whole.

- (๗) Have academic and professional ethics

1.2 Teaching methods

- (๑) Individual project assignments and small group activities

- (๒) Discussion and conversation

(๓) Exchange knowledge on issues of common interest and issues of conflicting or differing opinions.

(๔) Research, analyze, and summarize knowledge from both theory and field, and present the knowledge obtained according to the integrated academic system.

1.3 Evaluation Method

- (๑) Project Presentation Evaluation

- (๒) Evaluation of process and working methods in groups

- (๓) Assessment from academic writing and tests

2. Knowledge

2.1 Knowledge that needs to be developed

- (๑) Important principles and theories in terms of content

- (๒) The impact of research in the field on the novelty and advancement of the subject

- (๓) Continually develop critical communication skills

2.2 Teaching methods

- (๑) Hyflex learning

- (๒) Module learning

- (๓) Use active and thought-provoking teaching strategies.

- (๔) Assign activities to track progress on each learning task.

- (๕) Provide feedback and continuous feedback before the next learning session.

2.3 Evaluation Method

- (๑) Assess classroom activities

- (๒) Evaluate individual academic writing

- (๓) Evaluate learning behavior when in a group

- (๔) Evaluated from the test

3. Intellectual skills

3.1 Intellectual skills that need to be developed

- (๑) Think critically and systematically.

- (๒) Research, interpret and evaluate information to use in creative problem solving.

- (๓) Collect, study, analyze and summarize issues and needs.

- (๔) Apply knowledge and skills to problem solving appropriately.

3.2 Teaching methods

- (๑) Search for information from real and virtual learning resources.
- (๒) Verify the obtained data for reliability.
- (3) Analyze and synthesize data and information and extract it into knowledge.
- (4) Present knowledge in the form of aesthetic conversation and learning exchange

3.3 Evaluation Method

- (๑) Evaluate the quality of individual academic documents
- (๒) Evaluate oral presentations
- (๓) **Evaluate how to respond to problems or improve work.**

4. Interpersonal skills and responsibility

4.1 Interpersonal skills and responsibility that need to be developed

- (๑) Communicate with a variety of people, able to converse in both Thai and foreign languages effectively.
- (2) Provide assistance and facilitate problem solving in various situations within the group, both in the role of leader or in the role of team member.
- (3) Find appropriate solutions to complex problems
- (4) Able to make decisions on operations by oneself and can perform self-evaluation.
- (5) Take responsibility for your own operations.
- (6) Be responsible for your own actions and take responsibility for the work in the group.
- (7) Take the initiative to express issues for resolving personal and public situations and express an appropriate stance for both you and the group.

4.2 Teaching methods

- (1) Establish flexible sub-teams and assign tasks.
- (๒) Propose a process and action plan
- (๓) Putting plans and processes into practice
- (๔) Monitor the progress of the work.
- (๕) Review performance and improvements

4.3 Evaluation Method

- (๑) Suitability of work processes
- (๒) Consistency between plans and actual implementation
- (๓) Performance according to specified quality indicators

5. Numerical analysis, communication and information technology skills

5.1 Numerical analysis, communication and information technology skills that need to be developed

- (1) Have skills in using the necessary tools currently available for work related to information technology, especially AI.
- (2) Suggest solutions to problems using mathematical or statistical information to solve related problems in a creative way.
- (3) Communicate effectively both orally and in writing, choosing appropriate presentation media formats.
- (4) Use information and communication technology appropriately.

5.2 Teaching methods

- (๑) Study research articles in the field of study and discipline published in academic journals.
- (๒) Find field knowledge
- (๓) Record knowledge and reflection
- (๔) Online learning exchange
- (๕) Plan to use knowledge or experiment with development into management innovations.

5.3 Evaluation Method

- (๑) Evaluated from reports and activities during the study

6. ด้านอื่นๆ

- (๑)
- (๒)
- (๓)

notation

- Primary responsibilities
- Secondary responsibility
- Empty Not Responsible

which will be displayed on the map illustrating the distribution of responsibilities for learning outcome standards from the curriculum to specific subjects (Curriculum Mapping).

Sector 5 Teaching plans and evaluation

1. Teaching plans

Week	Topic	Number of hours	Learning Activities Teaching/Media Used	Instructor
1 20/7/2025	Course Orientation	6	Relevant readings and research, Lectures, Group Activities, Academic Writing and known exams	Assoc. Professor Dr. Kuncharee Kakhai
	Theories and principles of a knowledge-based society		Lecture, group activities, study research articles, appropriate practice case studies	
2 17/8/2025	Political and governmental regimes and the economy	6	Lecture, group activities, study research articles, Lesson learned	
3 31/ 8/2025	Education and Knowledge - based society	6	Lecture, group activities, study research articles, Lesson learned	
4 14/9/2025	Lifelong Learning, informal learning, nonformal learning, upskill and reskill	6	Lectures, group activities, study research articles,	
5 28/9/2025	The establishment of an innovative-driven enterprise focused on entrepreneurs and centered around user and customer management innovations.	6	Lectures, group activities, study research articles, practical training	
6 19 /10/ 2025	Knowledge management	6	Lectures, group activities, study research articles, knowledge sharing, lesson learned	
7 2/11/2025	Foresight, creativity, cognitive adaptability, and Scenario	6	Lectures, group activities, study research articles, practical training	
8 16/11/2025	Examination	3	Online	
Total		45		

2. Learning Assessment Plan

(Specify the learning assessment method for each sub-topic as shown in the curriculum map

(Curriculum Mapping) as specified in the curriculum details, assessment week and assessment proportion)

Learning outcomes	Methods for assessing learning outcomes	Evaluation Week	Proportion of evaluation
Morals and ethics that need to be developed	(1) Evaluate the comprehensiveness of the work. (2) Evaluate the timeliness of the agreement. (3) Evaluate the morals and ethics that should be fostered within the group of friends throughout the collaborative process.	Throughout the study	10
Knowledge	(1) assessed from individual academic articles (2) assessed by tests within the specified time	Throughout the study	45
Intellectual skills	(1) assessed from the thinking process and classroom interaction (2) assess the quality of thinking from the assigned work	Throughout the study	
Interpersonal skills and responsibility	(1) Self-assessment based on the role of responsibility in the work plan and assignment (2) Self-assessment with a group of friends from the group work process	Throughout the study	

Numerical analysis, communication and information technology skills	Evaluation from Academic paper assignment		45
The assessment is based on the graduate criteria A = 86-100 A- = 82-85 B+ = 78-81 B = 74-77 Below B is considered a failure			100

Submit the article on time as agreed

Section 6 Teaching Resources

1. Textbooks and primary documents can be searched from google.co.th

1.1 แผนพัฒนาเศรษฐกิจแห่งชาติฉบับที่ 13 2566-2570

1.2 ภาวะเศรษฐกิจไตรมาสที่ 1/2568 และแนวโน้มปี 2568 from <https://www.nesdc.go.th>

1.3 Asia Pacific's Time Responding to the new reality from <https://www.pwc.com/>

1.4 Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific

<https://www.adb.org/>

1.5 ASIAN DEVELOPMENT OUTLOOK TRADE UNCERTAINTY CHALLENGES RESILIENCE IN ASIA AND THE PACIFIC

APRIL 2025

2. Articles (Retrieved from google.co.th)

1. Obrom Aranyapruk (2022) Strategies for Building a Knowledge-Based Economy for Community Enterprises in the Eastern Economic Development Zone <https://doi.org/10.57260/rcmrj.2022.261618>
2. Bermeo Giraldo, M.C., Patiño Toro, O.N., Valencia Arias, A., Benjumea Arias, M.L., & Bran Piedrahita, L. (2022). Research trends of the knowledge-based economy: A bibliometric study. *Intangible Capital*, 18(2), 290-313. <https://doi.org/10.3926/ic.2048>
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5. Papagiannidis, E., Mikalef, P. & Conboy, K. (2025) Responsible artificial intelligence governance: A review and research framework *Journal of Strategic Information Systems* <https://pdf.sciencedirectassets.com/>
6. Al-Qahtani, A.S.S.A.; Shirazi, N.S. What Are the Binding Constraints for a Knowledge-Based Economy in Qatar? *Sustainability* 2023, 15, 3871. <https://doi.org/10.3390/su15053871>
7. Kenaphoom, S., & Jantanukul, W. (2025). The Education Public Private Partnership Model. *Asian Education and Learning Review*, 3(1), Article 1. <https://doi.org/10.14456/aelr.2025.1>
8. Ayu Mustika Sari, Abdulah, Wiwik Maladerita, Azwar Ananda, Rusdinal, Nurhizrah Gistituati (2022) State Finland Education System and Finland Education Best Practice International Journal Of Humanities Education And Social Sciences (IJHESS) E-ISSN: 2808-1765 Volume 1, Number 6, June 2022, Page. 960 - 969
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10. Jazuli Akhmad, Cherry Austin Navira, Farika Chandrasari, Reliusman Dachi (2024) Efforts to Reduce Educated Unemployment in ASEAN through the Work and Holiday Visa (WHV) Australia Program *Journal of Economics, Finance and Management Studies*
11. Mahoney, M.; Kiernan, A. A Critique of the Ambitions and Challenges of the Lifelong Learning Entitlement (LLE) from a Lifelong Learning Perspective. *Educ. Sci.* 2024, 14, 713. <https://doi.org/10.3390/educsci14070713>
12. Mahedi Hasan, Md. Anamul Haque, Sabrina Sharmin Nishat and Md. Monzur Hossain (2024) Upskilling and Reskilling in a Rapidly Changing Job Market: Strategies for Organizations to Maintain Workforce Agility and Adaptability *European Journal of Business and Management Research* Vol 9 | Issue 6 | December 2024 ISSN 2507-1076
13. Deti Elice, Andino Maseleno & Agus Pahrudin (2024) Formal, Informal and Non Formal Education Systems <https://journal.hmjournals.com/> 4, 1
14. Janthapass, S., Chanthapassa, N., & Kenaphoom, S. (2024). The Evolution of Lifelong Learning: From Traditional Classrooms to Anywhere, Anytime Education. *Asian Education and Learning Review*, 2(1), 42-54. <https://doi.org/10.14456/aelr.2024.4>
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16. Nawroth, G., Brem, A. & Rymarczyk, C. (2023) Open innovation and closed innovation: a simulation study on market conditions and innovation strategies *Int. J. Technology Management*, Vol. 92, Nos. 1/2, 2023
17. Song, Minkyu, and Boyoung Kim. 2024. An Analysis of Critical Factors Affecting the Success of Open Innovation Strategies in High-Tech Firms: The Case of South Korea. *Administrative Sciences* 14: 274. <https://doi.org/10.3390/admsci14110274>
18. Rezaei, M. (2025) Artificial intelligence in knowledge management: Identifying and addressing the key implementation Challenge *Technological Forecasting & Social Change*
19. CHOW (Jerry) Tong Wooi (2024) Knowledge Management in the 21st Century: Trends, Developments, and Strategies *INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY: APPLIED BUSINESS AND EDUCATION RESEARCH* 2024, Vol. 5, No. 10, 4234 – 4257 <http://dx.doi.org/10.11594/ijmaber.05.10.29>
20. John Edwards & Antti Lönnqvist (2023) The future of knowledge management: an agenda for research and practice, *Knowledge Management Research & Practice*, 21:5, 909-916, DOI: 10.1080/14778238.2023.2202509
21. Constantin Ionuț Constantin & Nicoleta-Valentina Florea (2022) Leadership and Creativity – A Vital Skill for Individual and Organizational Performance *RESEARCH AND EDUCATION* Nr. 7 / 2022 ISSN 2559-2033 ISSN-L 2559-2033 www.researchandeducation.ro
22. Rui Xing, Nan Zhou, Zhanpeng Dang and Guohong Wang (2021) The Relationship Between Cognitive Adaptability and Entrepreneurial Decision-making Quality: A Moderating Effect of Environmental Uncertainty *Advances in Social Science, Education and Humanities Research*, Proceedings of the 4th International Seminar on Education Research and Social Science (ISERSS 2021)
23. Mayur Jariwala (2024) Contingency Planning: The Need, Benefits, and Implementation of Scenario Planning *International Journal of Trend in Scientific Research and Development (IJTSRD)* Volume 8 Issue 3, May-June 2024

Website

<https://www.bain.com/insights/management-tools-and-trends-2023/>

Section 7 Evaluation and improvement of course implementation

1. Strategies for evaluating course effectiveness by students

University teaching evaluation form

2. Teaching Evaluation Strategy

(Specify the evaluation method to obtain teaching data, such as from observers or teaching teams or student learning results, etc.) Evaluation by the College of Innovation and Management or from observation of teaching by the supervising teacher and student learning results

3. Improving teaching

(Explain the mechanisms and methods for improving teaching, such as how the faculty/department has determined the mechanisms and methods for improving teaching. Classroom research, workshops for improving teaching, etc.)

The College of Innovation and Management requires the instructor or instructor supervising the subject to review and improve the teaching strategies and methods based on the results of the evaluation of the effectiveness of the subject and prepare a report when the teaching is completed.

4. Reviewing the student achievement standards in the subject

(Describe the process used to review the student achievement standards according to the learning outcomes of the subject, such as reviewing from exam scores or assignments. The process may be different for different subjects or for each learning outcomes standard)

During the teaching process, there is a review of achievements in each topic according to the teaching plan, receiving feedback and voluntary input from students, and considering the results of various specified activities.

5. Review and planning for improving course effectiveness

(Describe the process of using the data from the evaluations in items 1 and 2 to plan for improving quality)

The department has a system for reviewing course effectiveness based on student teaching evaluations. After reviewing course effectiveness, instructors are responsible for reviewing the content taught and teaching strategies used, and for suggesting ways to improve the lesson plan for future teaching.

Individual assignment

Students are required to compose a scholarly paper in either Thai or English, depending on proficiency.

The paper should be between 6 to 8 pages in length, not including references.

Subject Requirements:

1. The topic must be:

1.1 Within the realm of knowledge-based economic society.

1.2 Novel and original.

2. Format of Presentation:

Title Page

Abstract in both Thai and English

Keywords in both Thai and English

Introduction

Main Content (Citations in APA format)

Conclusion

References:

A minimum of 20 references is required, with at least 10 sourced from research conducted both in Thailand and internationally. The references should be from academic works published between 2015 and 2025.

Submission Guidelines:

1. The paper must pass the Turnitin assessment prior to submission, showing no more than 15% similarity.

2. Submit the paper by the designated deadline. 16/11/2025

นักศึกษาทุกคนที่เรียนรายวิชาการจัดการสังคมเศรษฐกิจฐานความรู้ ภาคเรียนที่ 1/2568

ก่อนเรียนมีเรื่องแจ้งเพื่อทราบ ดังนี้

1. ผู้สอนได้ส่งมคอ.3 ล่วงหน้า 1 เดือนเพื่อให้นักศึกษาได้เตรียมตัวค้นหาตำราและเอกสารที่ต้องใช้ประกอบการเรียน
2. ก่อนเรียน 1 สัปดาห์ทุกครั้งผู้สอนจะส่งแผนการจัดการเรียนรู้พร้อมสรุปสั้นและppt แต่ละโมดูล เป็นภาษาอังกฤษ
3. หลังการเรียนแต่ละครั้งจะมีแบบประเมินสั้นๆเพื่อให้นักศึกษาได้แสดงความคิดเห็นและความรู้ของตน โดยให้ส่งภายในวันที่กำหนดสำหรับผู้สอนจะได้อ่านและให้ความเห็นกลับในสัปดาห์ถัดไป ขอให้ส่งตามเวลาที่กำหนด
4. มีงาน 1 ชิ้นที่ทุกคนต้องทำ คือ การเขียนบทความวิชาการ เกณฑ์เป็นดังเอกสารที่ส่งมาด้วย
5. การประเมินผลปลายภาคเป็นการสอบข้อเขียนใช้เวลา 3 ชั่วโมง สอบออนไลน์เมื่อปิดห้องสอบนักศึกษาต้องส่งข้อสอบทันที
6. เพื่อความเข้าใจที่ตรงกัน ให้ส่งเป็นภาษาเขียนสื่อสารถึงสิ่งที่ต้องการบอกกล่าว งดส่งอีโมจิ

กฤษกร คำชาย

ผู้สอน

20/6/2568



Tools for Transforming from VUCA World to BANI World: A Case of Educational Sector in Thailand

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Abstract

This paper aims to identify key skills for transformation from a VUCA world to a BANI world and how the Thai educational system can prepare students for this transformation. The VUCA world, which is volatile, uncertain, complex and ambiguous, is rapidly giving way in the post-pandemic period to a BANI world, which is brittle, anxious, nonlinear and incomprehensible. The BANI world is increasingly chaotic, with challenges that are completely unknown and cannot be predicted. While this is a relatively new concept, it is clear that there are tools that can be used to respond to the BANI world, including resilience and slack, alertness, mindfulness and empathy, adaptability and flexibility, and tools like data literacy, media literacy, and critical thinking. Today, the Thai educational system has gap and lack of some ability to promote and develop competent skills in students, as they have not been a priority in the past. Thus, the recommendation of this paper is that the educational system should be redeveloped to promote these skills from earlier or beginning stage such as early childhood.

Keywords: BANI, VUCA, Educational sector, Student preparation

Introduction

This paper aims to identify key skills for transformation from a VUCA world to a BANI world and how the Thai educational system can prepare its students for a BANI world. The world has always been a complex and uncertain place, one in which students and organizations face unknown challenges looking from the present into the future. However, not all kinds of uncertainty are the same. In the VUCA world, there are different kinds of chaotic influences on the present, including volatility, uncertainty, complexity, and ambiguity, which require individuals and organizations to address in different ways (Bennett & Lemoine, 2014). For example, an organization facing complexity may need to develop processes and systems to deal with that complexity by simplifying it as far as possible and ensuring that there are checks in handling complex procedures. However, managing the future is no longer quite as simple as only dealing with a VUCA world. The COVID-19 pandemic introduced further unpredictability into the world of individuals and organizations, creating a BANI world – one

which is brittle, anxious, non-linear and incomprehensible (de Godoy & Ribas Filho, 2021). This has created not just more uncertainty and more complexity, but a different kind of complexity, where flexibility and human responsiveness, more than comprehensive planning, are at the heart of dealing with unknown and unanticipated challenges (de Godoy & Filho, 2021). This is a fundamental paradigm shift and it is the origin of new or adaptive theoretical management model to fit for changing, where strategies developed for dealing with the future in a VUCA world may not be effective in a BANI world. As the BANI world is a relatively new concept (Cascio, 2020), there has been little application of the concept to the realm of education. This paper reflects on the difference between the VUCA and BANI worlds and how the Thai educational system can be readied to deal with it.

VUCA versus BANI worlds

The VUCA World

The acronym 'VUCA' originated in the management literature of the 1980s, when management theorists and others were beginning to look toward ways of dealing with complexity in an increasingly chaotic and changeable environment (Gläser, 2022). The term took hold in the 1990s, as it was adopted in the post-Cold War era to deal with unprecedented amounts of international political, military, and economic change that began to occur rapidly at that time (Gläser, 2022). In the 2000s, the term became commonplace in the business strategy literature, as a focal point of strategic thinking, foresight and planning (Bennett & Lemoine, 2014). Thus, the principle of VUCA has been understood for some time.

VUCA is an acronym, whose components stand for Volatility – Uncertainty – Complexity – Ambiguity (Bennett & Lemoine, 2014) as presented in Figure 1. Although these seem like challenging conditions, according to various authors they were reasonably well understood in terms of the challenges that they posed at the present (Bennett & Lemoine, 2014). For example, complexity implied that problems had a lot of different elements, and not all information was available to solve the problem. Ambiguity meant that there were unclear relationships between situations, while volatility implied rapid change and uncertainty meaning that the situation was not yet predictable (Bennett & Lemoine, 2014). These operating conditions are complex, but there have been known ways to manage them. For example, it was well understood that organizations needed effective leadership that identified upcoming challenges and supplied the resources and tools needed to deal with them (Sarkar, 2016). Organizations needed structure to deal with complexity, but also needed to retain some point of flexibility that would allow them to deal with ambiguity and volatility (Baran & Woznyj, 2020). Organizations needed to be willing to experiment and test hypotheses to resolve ambiguity, and simply be ready to deal with a certain amount of complexity in the operating environment (Bennett & Lemoine, 2014). Thus, in a VUCA world, organizations were dealing with challenging, but ultimately manageable, operating conditions in which they could make reasonable strategic decisions that had a good chance of leading to success.

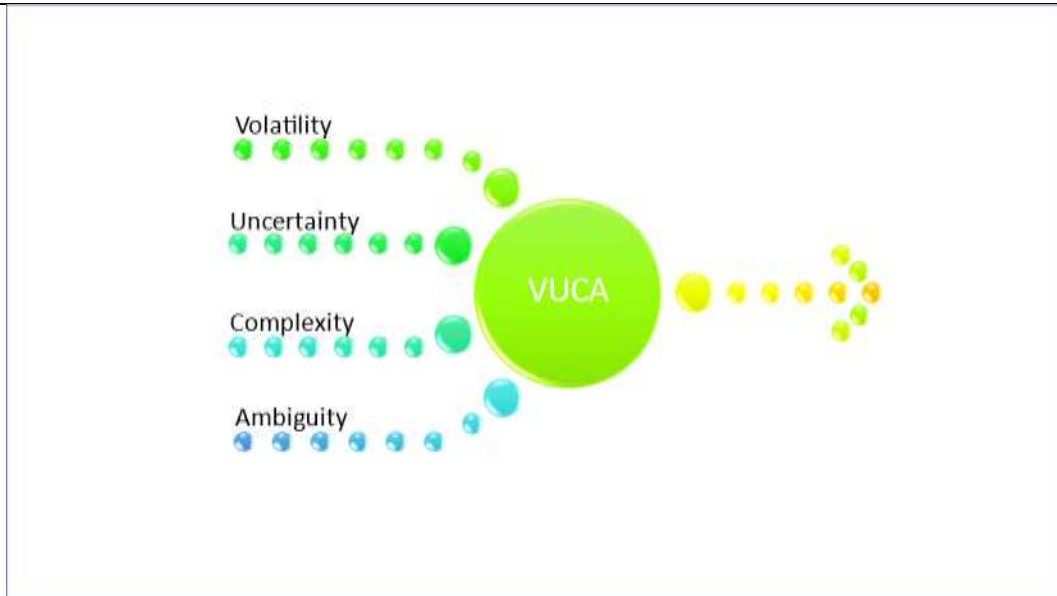


Figure 1 VUCA (Author's own work)

The BANI World

The COVID-19 pandemic almost immediately began to reveal an uncomfortable fact about organizations operating in a VUCA world – they were not nearly as suited to a chaotic and challenging environment as their leaders and stakeholders believed (Worley & Jules, 2020). Very rapidly, it became clear that organizations were not flexible, but fragile, as supply chains began to break and organizational disruption began to take hold (Worley & Jules, 2020). Observing this rapid descent into chaotic non-functionality in the face of an unpredictable shortage of resources, the new term ‘BANI’ was coined the new term ‘BANI’ as presented in Figure 2 – a world which is Brittle, Anxious, Nonlinear, and Incomprehensible (Cascio, 2020). As Cascio (2020) remarked, this describes “increasingly commonplace situations in which simple volatility or complexity are insufficient lenses through which to understand what is taking place. Situations in which conditions are not simply unstable, they are chaotic. In which outcomes are not simply hard to foresee, they are completely unpredictable. Or, to use the particular language of these frameworks, situations where what happens is not simply ambiguous, it is incomprehensible.” (Cascio, 2020). The BANI world also makes new demands on educational leaders, ranging from improved problem solving and teamwork to emotional intelligence, creativity, and other skills and experiences that enable leadership to guide educational organizations through rapid change (Ratanapitakdhada & Trirat, 2023). At the same time, the BANI world offers opportunities for learning through engagement of the individual’s intrinsic motivation for learning and curiosity, particularly if early efforts are made to encourage flexibility in learning and lifelong learning (Panthalookaran, 2022). There is also the opportunity for educational transformation, with a shifting focus on creativity and arts to address uncertainty (Mullooly, 2022). In other words, the world is no longer just slightly challenging but business as usual – it is completely changed.



Cascio's (2020) BANI model identifies four characteristics of a chaotic world in which even the near future is not just unknown, but unknowable. First, it is brittle – systems may seem strong, but they are not resilient and are prone to “sudden and catastrophic failure” (Cascio, 2020). A BANI world is also anxious, or in other words rife with fear, depression, helplessness, and the sense that “every choice appears to be potentially disastrous (Cascio, 2020).” The nonlinearity of the BANI world means that cause and effect may seem to be unconnected, or where the effect may seem to be far greater than the cause; seemingly minor problems can cause outsized failures. Finally, the BANI world is incomprehensible – answers may not seem logical and may not fit with our existing knowledge (Cascio, 2020). Thus, the BANI world is no longer business as usual, and dealing with it is not a question of logical resource assignment and risk acceptance, but is emotionally entangled, complex, and to some extent incomprehensible, at least in the short term.

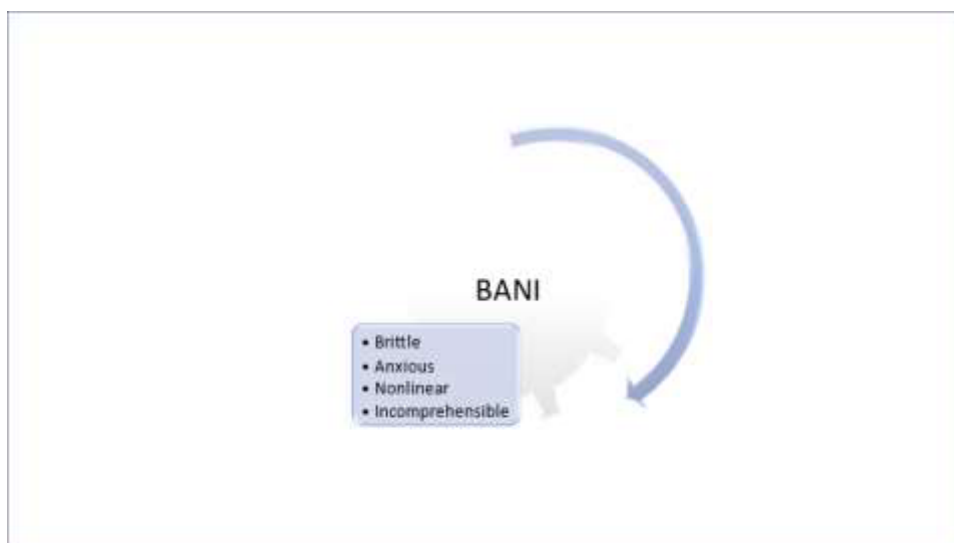


Figure 2 BANI (Author's own work)

Tools for Dealing with a BANI World

The relative novelty of the concept of the BANI world means there is little research addressing what the key success factors are or how such a world can be dealt with. However, there has been some thought as to what tools could be useful for the BANI world, which address the complexities and unknowns of this world. Cascio (2020) suggests that “brittleness could be met by resilience and slack; anxiety can be eased by empathy and mindfulness; nonlinearity would need context and flexibility; incomprehensibility asks for transparency and intuition.” The author acknowledges that these are responses, more than tools that could be leveraged into addressing the problems of the BANI world, but also notes that over time it is likely that the BANI world will become less incomprehensible. Therefore, better tools and coping mechanisms for the BANI world may be found in time.

Mitzkus (2022) offers four tools to deal with the BANI world's challenges and chaotic nature, this time explaining in more depth what their importance is and how they matter in individual and organizational terms (Mitzkus, 2022). Like Cascio (2020), Mitzkus (2022) argues that resilience is a necessary tool to deal with brittleness; resilience allows organizations and individuals to withstand pressure and to return to their initial condition relatively quickly. Attention is argued as the antidote to anxiety, as paying attention to the world can help identify causes of anxiety, determine when something is a real problem and when it is overblown or even 'fake news' (Mitzkus, 2022). Adaptability is argued as a tool to deal with nonlinearity, as individuals and organizations that can rapidly adapt to new circumstances are able to succeed regardless of what the end conditions are, and because flexible adaptation can avoid excessively strong responses that create nonlinearity. Finally, transparency is argued as a tool against incomprehensibility, as the more transparent something is, the more effectively it can be understood and made sense of (Mitzkus, 2022). In summary, the combination of these two authors suggests there are four key tools that need to be developed include resilience; attention, empathy and mindfulness; adaptability and flexibility; and transparency and intuition. This raises the question of how these traits can be developed within the context of the educational system.

In a post-COVID world, Beale (2020) points out, physical and psychological resiliences are at least as important as academic resilience (Beale, 2020). Therefore, this is one of the key priorities for education in a BANI world. There is some research into what is required to develop resilience among students. Holdsworth et al. (2018) suggests that students need support networks of friends, family, and school personnel, along with tools to stay mentally and physically healthy and perspective-challenging activities like goal-setting and self-reflection, to become resilient (Holdsworth et al., 2018). Students may also need internal resources like self-efficacy beliefs, confidence, emotional intelligence, and optimism, to develop resilience (Hughes et al., 2021). Therefore, it is relatively well known what has to be developed in order to enable students to be resilient in the face of change.

Developing attention, empathy and mindfulness is also critical for students. Mindfulness and attention can be developed through regular practice of activities like mindfulness exercises and mindfulness meditation, as has been shown in prior research (Weare, 2013). These activities can be used from a relatively young age, although research into their use in formal education among younger students is limited (Weare, 2013). Empathy develops naturally in early childhood, but can also be supported through stories, art, and conversation and interaction with others (Lithoxoidou et al., 2017).

Developing adaptability has previously been less of a focus of research, but recent studies have focused on it as a critical aspect of student effectiveness in the post-COVID period (Stockinger et al., 2021). Stockinger et al. (2021) found that students that had a greater ability to adapt to changing circumstances experienced higher levels of hope and lower levels of anxiety and hopelessness, as well as indirectly increased levels of perceived learning.

Therefore, although this has not yet been much of a focus of research, it is clear that developing adaptability needs to be a priority.

While transparency is a feature of the situation or environment (Cascio, 2020; Grabmeier, 2020; Mitzkus, 2022), there are ways that individuals can be taught to deal with transparency. For example, students who are taught data literacy, media literacy and critical thinking skills may be better positioned to identify ‘fake news’ and distinguish rational and fact-based information from lies and exaggerations (Knaus, 2020; Machete & Turpin, 2020). Therefore, schools should be prepared to teach media literacy and critical thinking in order to prepare students for a BANI world.

Another approach to addressing the BANI world is through focus on development of creativity and technical capabilities. Mullooly (2022) advocated for arts-based and activist educational practice to help students develop creativity and resilience in response to a BANI world. Panthaloorkaran (2022) pointed out that individual motivations for learning are critically important in overcoming learning challenges as well, and suggested that entrepreneurial education could benefit from increased emphasis on creativity and flexibility. Education in the principles of sustainability has also been highlighted as a key tool for preparing students for the future BANI world (Marcos-Sánchez et al., 2022). Thus, there are many opportunities to facilitate learning in the BANI world.

To sum up, in order to prepare students for this new environment, the BANI world necessitates the development of resilience, attentiveness, empathy, flexibility, and transparency in addition to creative teaching methods. Developing creativity and technical competency through arts-based education, highlighting individual motivation for learning, and teaching sustainability values are alternative strategies for equipping students for the challenges of the BANI world.

The Readiness of Thai Education for BANI World

Given the literature above, there are several ways which an education system can prepare students for a BANI world. Firstly, student psychological and physical resilience, as well as academic resilience, should be developed and supported to combat brittleness. Students’ attention, empathy, and mindfulness should be developed to address anxiety. Student adaptability should be enhanced to deal with nonlinearity. Finally, students should be taught essential skills like media literacy, data literacy, and critical thinking in order to deal with the fundamental issue of incomprehensibility. This issue raises the question of how prepared the Thai education system is to meet these challenges.

The resilience of the Thai educational system and its ability to instil resilience in its students is a major issue for the post COVID-19 world (Intharawiset et al., 2021). Although the Thai educational system adapted somewhat to the demands of the COVID-19 pandemic, like other countries the application of a high level of stress

did lead to unpredictable breakdowns in the educational system (Intharawiset et al., 2021). Perhaps even more importantly, there was no allowance for the resilience of students themselves, and many students experienced negative academic and psychological effects from the pandemic that were not easily recoverable (Intharawiset et al., 2021). Thai students already face challenges due to high pressure to succeed academically, as well as the economic strain that education can place on families (Yeung & Li, 2021). In addition to students, the resilience of Thai teachers has also been strained significantly by the COVID-19 pandemic, adding on to existing stressors that were already in place due to factors like working condition and educational policy (Ratanasiripong et al., 2022). These authors surveyed public school teachers, finding high rates of burnout and associated problems like stress, anxiety, and emotional exhaustion. In part, this can be attributed to a general surge in mental health issues during the COVID-19 pandemic, where uncertainty, isolation, physical illness, and stress contributed to widespread unease (Ruengorn et al., 2022). Thus, the lack of resilience within the Thai educational system is not just due to the effect of the COVID-19 pandemic on students – it is part of a widespread and pre-existing state, which the pandemic brought into stark contrast. This is therefore one area where there is a need for significantly more focus, as developing student resilience needs to begin from an early age, in order to address the increasingly brittle world they encounter.

The development of alertness, empathy and mindfulness are also an area where the Thai educational system is not fully succeeding, mainly because it has not been designed to do so. The Basic Core Curriculum does include “morality... and ability to live in peace and harmony in the world community (The Ministry of Education Thailand, 2008).” However, this objective does not translate into active teaching of alertness, empathy or mindfulness. There have been some experimental approaches to teaching mindfulness, for example the use of the Buddhist principles of Trisikkha (wisdom, mentality, and morality) and mindfulness teaching in Buddhist schools (Klechaya & Glasson, 2017). The development of these kinds of teaching practices could be significantly expanded, to give students throughout the Thai educational system the tools to deal with the anxiety of the BANI world.

The literature on developing adaptability of students is limited, as this has only recently become a concern (Stockinger et al., 2021). In fact, no research could be identified into the extent of adaptability and flexibility of Thai students at any level, suggesting that to date this has not been a major concern of the academic world. As Stockinger et al. (2021) has noted, this is one issue that has been addressed previously. However, it can be observed that this is not one of the major concerns of the Basic Core Curriculum (The Ministry of Education Thailand, 2008), and the author could not find any mention elsewhere about its development. This is not only a problem of Thailand. As Sadovaya and Simonova (2016) have noted, adaptability is a trait relating to the social environment, and not an academic practice or trait (Sadovaya & Simonova, 2016). Therefore, teaching students to be adaptable is an issue of the social environment of the classroom rather than the curriculum (Sadovaya & Simonova, 2016).

This implies that the learning environment of Thai schools should be changed to enable greater adaptability, as currently Thai classroom culture is often very teacher-focused, rigid and inflexible (Nicholls & Apiwattanakorn, 2015). Therefore, promoting adaptability may require a significant change in educational practice from the bottom up.

Finally, how well does the Thai educational system perform on data literacy, media literacy, and critical thinking, which are essential to deal with incomprehensibility? The answer appears to be ‘not well’. The Basic Core Curriculum, which specifies minimum educational outcomes for elementary and lower secondary students, does not specifically address outcomes or teaching practices like critical thinking, arts-based education, or entrepreneurial education (The Ministry of Education Thailand, 2008). While there have been experiments in developing data literacy through artificial intelligence (AI) and other tools, these have only recently been introduced and do not fully address the need for data literacy (Aung et al., 2022). Recent studies have also highlighted gaps in media literacy, which also are the basis for calls for educational reform (Chainan, 2022). While there have been calls for reform to improve societal resilience in general, these calls have focused on large-scale economic sectors and societal institutions, not on education per se (Marome & Shaw, 2021). Media literacy and digital literacy have become more important at the university level, but still have not been integrated at the pre-university level (Seechalio, 2021). Critical thinking development is also still weak according to assessments of Thai students at the undergraduate level (Ploysangwal, 2018). Various assessments of critical thinking among Thai undergraduate students have shown that critical thinking dispositions are low to moderate on average (Sireerat et al., 2022) and that there is a need to enhance critical thinking skills at the lower secondary level (Kwangmuang et al., 2021). Thus, there are still significant gaps in the preparation of Thai students for a BANI world. Overall, therefore, this is a significant issue in the educational system.

To summarize, the concept of readiness and non-readiness refers to the Thai educational system's ability to appropriately prepare students for the complexity of a BANI environment. Readiness includes developing resilience, emotional intelligence, flexibility, and crucial cognitive abilities. Non-readiness, on the other hand, highlights deficiencies in these areas caused by the COVID-19 epidemic and limitations in the school curriculum. It is critical to address these problems in order to better educate students for the complex difficulties of the modern world.

Conclusions and Recommendations

In conclusion, the BANI world requires different skills and strategies to cope with than the VUCA world. Table 1 summarizes the differences between a VUCA world and a BANI world in the context of education. Students need resilience to deal with brittleness; alertness, empathy, and mindfulness to reduce their experience of anxiety; adaptability to meet the challenges of nonlinearity; and multiple tools like data literacy, media literacy, and critical thinking skills to allow them to create transparency and deal with the fundamental incomprehensibility



of the BANI world. These tools allow individuals to cope relatively well with the unpredictable, chaotic situations that a BANI world has placed them in.

The BANI worldview is a relatively new one, and there is as yet little research into how organizations or individuals can best deal with it. However, the evidence that does exist suggests that the Thai educational system is not well situated at present to prepare students for operating in a BANI world. The main recommendation of this paper is that the educational system in Thailand needs to be reoriented toward developing the resilience, alertness, adaptability and ability to create transparency that students will need to deal with the chaotic BANI world of their future. This skill development must begin with supporting the development of student psychological, physical and academic resilience and adaptability through redesigning of the classroom social environment to take into account student needs and to create continually changing challenges. Beginning in early childhood education, development of the empathy, alertness and mindfulness of students should be a priority, encouraging them to care for others and potentially drawing on Buddhist mindfulness practice to develop these skills. Finally, modern skills including data literacy, media literacy, and critical thinking should be prioritized beginning in early childhood education, to make sure that Thai students are prepared for the future BANI world and its chaotic and unpredictable challenges.

Table 1 VUCA vs. BANI world

	VUCA	BANI
The world is...	Volatile, uncertain, complex, ambiguous	Brittle, anxious, non-linear, incomprehensible
This creates...	Uncertainty, expectation of change	Anxiety, inability to detect or deal with change
The world can be dealt with through...	Leadership, structure, environmental scanning and foresight, experimentation	Resilience, attention, adaptability, transparency
Educational priorities are...	Information technology, entrepreneurship, foresight	Resilience, critical thinking, media literacy, arts and creativity



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Artificial Intelligence and Creativity

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ABSTRACT

The question of whether machines can be creative has been at the centre of debates among scholars and practitioners well before the inception of artificial intelligence (AI) as a recognised field of research. This paper reviews how some of the key thinkers in the fields of creativity and AI have approached this question, contextualising their views within the ebbs and flows of AI technological developments, from the 1950s until now. The thread of this overview is Margaret Boden's identification of *novelty*, *surprisingness* and *value*, as the three cardinal features of creativity. This review will retrace the steps of the quest of artificial intelligence researchers as they strive to replicate each of these three properties within human-made machines. The paper closes with a reflection on how the third of these properties, value, prompts us to consider societal challenges raised by the widespread adoption of AI for creativity that transcend the question: 'Can AI be creative?'

1 | AI's Foundational Quest for Creative Agents

In one of its most notable definitions, 'Creativity is the ability to come up with ideas or artefacts that are new, surprising and valuable'. (Boden 2004, 1) This definition was given by Margaret Boden, a professor in cognitive science who pioneered the field of philosophy of cognitive science. Boden is also credited with having widened the investigation of creativity beyond its traditional focus on human and animal creativity to encompass computational systems. Her definition of creativity was destined to become the reference against which forthcoming studies on creativity would have confronted themselves with. This paper will follow in the same footsteps, starting from Boden's definition to retrace the history of the relationship between creativity and artificial intelligence (AI). In particular, it will review how researchers have strived to

develop AI systems that display each of the three features of creativity identified by Boden: from *novelty*, through *surprise* and finally to *value*.

'Can machines be creative?'. This is a question many thinkers grappled with, way before the origin of AI as a field of research. Numerous scholars quote the words written by Ada Lovelace, an English mathematician who collaborated with Charles Babbage on the first prototype of a digital computer, as one of the first objections against the possibility for machines to be creative (Boden 2004; Bown 2021; Kind 2022; Natale and Henrickson 2022). In particular, Lovelace's claim against machine creativity refers to the inability of the computational systems, which she and Babbage were developing to display the first of the three features identified by Boden as essential to creativity, that is, novelty:

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The Analytical Engine has no pretensions whatever to originate anything. It can do whatever we know how to order it to perform. It can follow analysis; but it has no power of anticipating any analytical relations or truths. Its province is to assist us in making available what we are already acquainted with.

(Lovelace 1843, Note G)

This objection, known as the ‘Lovelace objection’ was contested more than a century later by another pioneer of modern computer science: Alan Turing. In his influential paper ‘Computing machinery and intelligence,’ (1950) Turing points out how Lovelace’s claim was grounded on the evidence that she had available about the Analytical engine, while ‘It is quite possible that the machines in question had in a sense got this property’. (Turing 1950, 450) Lovelace’s objection should, therefore, according to Turing’s reading, be interpreted only as applicable to the capabilities of the pioneering computational systems which were created in Lovelace’s time, and it should not be extended to their future developments and innovations. In essence, Turing’s response to Lovelace’s objection is based on the fact that we can conceive of human brains as machines; therefore, if human brains can produce something new, machines should also be able to do the same (Turing 1950).¹

The term ‘Artificial Intelligence’ was coined in the same years in which Turing was developing his theories about human and artificial brains. Its creation is attributed to John McCarthy, an American computer scientist who co-organised a summer workshop in 1956 held at Dartmouth College, USA, which conventionally marks the start of AI as a research field. One of the co-organisers of the workshop was Marvin Minsky, American cognitive and computer scientist who contributed to many of the first advances in the theory and applications of AI. A report that Minsky published the same year of the Dartmouth workshop, ‘Heuristic Aspects of the Artificial Intelligence Problem,’ (1956) is a testament of how, from its inception, research in AI aspires to replicate human capabilities, including creativity.

As evidenced by Turing’s foundational paper, the possibility for machines to create something novel is already widely accepted in the mid-1950s. Minsky’s reflections focus rather on the ‘surprise’ effect that creativity originates in the spectators. In Minsky’s words:

It is perfectly true that no machine has been built which remains very impressive after careful study. But this may be more a reflection on the nature of being impressed than a reflection on the nature of machines or, for that matter, human brains.

(Minsky 1956, 3)

Surprise is a property that is more difficult to achieve by machines, but not primarily because of a lack of capacities of the latter, rather because of the observers’ attitude when judging the process they are witnessing.² In this report, Minsky also articulates the concept underpinning the so-called ‘AI-effect’ (McCorduck 2004), that is the phenomenon by which once

advancements are made in AI, particularly in accomplishing tasks perceived as indicators of intelligence, such as chess playing, these accomplishments tend to be downgraded as not truly indicative of intelligence or, in the context of this discussion, creativity. And one of the reasons for this, according to Minsky, should be found in the loss of the surprise effect that the said achievement suffers, when we are able to understand how it was possible to reach it:

as soon as any performance has been either mechanised or ‘explained,’ it is dropped, with appropriate qualifications, from the list of intelligent performances. And certainly, if a process is understood or ‘explained,’ then by that fact one no longer needs the notion of creativity in his description, and it seems only fair to drop it from the list of ‘creative’ acts.

(Minsky 1956, 3)

Animated by the optimism which characterised this first stage of AI research, early pioneers such as Allen Newell and Herbert Simon conducted ground-breaking experiments to demonstrate that AI can indeed generate novel concepts (Newell, Shaw, and Simon 1962; Simon 1985). Many are the theorists who support the relevance of novelty for creativity (Beardsley 1965; Boden (2004); Kronfeldner (2009); Simonton (1999); Stokes (2008, 2011, among others). However, novelty comes in degrees. Something might be novel in respect to the whole history of humankind (what Boden calls ‘historical creativity’, Boden 2004, 43–45), or it might be novel just for the individual who is undertaking the creative process in question (Boden’s ‘psychological creativity’). In the case of Newell and Simon’s experiments, attributing historical creativity would be incorrect as most of these experiments were aimed at recreating past achievements.

For example, among their most notable experiments we find ILLIAC, a programme designed to compose music using Palestrina’s rules of counterpoint (Newell, Shaw, and Simon 1962), BACON, which rediscovered Kepler’s third law and other laws of physics (Simon 1985), and the Logic Theorist, a programme ‘capable of discovering proofs for theorems in elementary symbolic logic’. (Newell, Shaw, and Simon 1962, 67) Newell and his collaborators define creativity as ‘a special class of problem-solving activity characterised by novelty, unconventionality, persistence and difficulty in problem formulation’. (Newell, Shaw, and Simon 1962, 66) Their reflections and experiments fall under an interpretation of creativity as something that is understandable, measurable and reproducible. In their view, we should not fall prey of the illusion that creativity is something reserved to a few creative ‘geniuses.’ Ordinary people can be equally creative, the only advantage that the first have over the latter is only their better heuristics abilities (Simon 1985).

Although the interpretation of creativity as problem-solving might be acceptable in the field of scientific discovery, it is not so in the field of the arts, where the Romantic tradition has historically shrouded creativity in an aura of awe and mystery that makes of creativity an unexplainable and enigmatic phenomenon (Miller 1996). In parallel, the use of AI for scientific discovery is usually less controversial (Langley 1987), whereas

the application of AI to instances of artistic creativity has been met with more resistance (as an example among many, see Dreyfus 1992).

This is partly due to the fact that the concept of surprise still remains elusive in AI. Something can be surprising in the sense that it is not easily predictable, or because it provokes unexpected reactions in the audience. In the first sense of ‘surprising’, it could be argued that everything that AI models do could in principle be predicted (Audi 2018).

One way to simulate unpredictability in machines is through randomness, which has been exploited as a device by the pioneers of computer art in the 1950s. Figures such as Max Bense advocated for generative aesthetics, leveraging computers and algorithms to create art that surprises through stochasticity, thus marking a convergence of the concepts of rule-bound creation and chaotic creativity (Nake, Nees, and Cohen 2019; Noll 1966; Pontus Hultén 1968). The computer artists of this time, like Georg Nees, Frieder Nake, and Michael Noll, are information engineers: the choice of technology and the mastery of its intricacies are still necessary in order to control the machines in delivering satisfactory outputs. In this era, artists navigate a terrain where rules, freedom, technical skills, and conceptual ideation intermingle, leading to new dimensions of artistic expression.

In the early 1970s, Harold Cohen, another artist/engineer, developed one of the first and most famous computational programmes for generating drawings: AARON (Garcia 2016). The collaboration between Cohen and AARON spanned many decades, and in the mid-1990s AARON was developed into a system that could colour forms and figures, in addition to drawing them. Despite this, Cohen was still reluctant to consider AARON creative, identifying rather the creativity in the exchange between the human and the machine:

Creativity—this particular example of creativity—lay in neither the programmer alone nor in the program alone, but in the dialog between program and programmer; a dialog resting upon the special and peculiarly intimate relationship that had grown up between us over the years.

(Cohen 2010, 9)

The debates around creativity and AI brought to the fore by Boden, as well as by artists such as Cohen in the last decades of the 20th century, dwindled somehow at the end of the century in correspondence with the second AI winter, a period of disillusionment following a rise in expectations for the potentiality of AI which was not matched by its achievements. But the field of AI was on the brink of a revolutionary moment, destined to catalyse a surge in debates surrounding creativity and AI: the success of neural networks and deep learning.

2 | The Rise of Debates on Creativity and AI

The primary factor contributing to the increase in debates around creativity and AI was the introduction of neural

networks, a method that aims to imitate how neurons work in animal brains to achieve better performance in machines. The history of artificial neural networks dates back to a pre-AI era. McCulloch and Pitts theorised the first computational model of a neuron in 1943 (McCulloch and Pitts 1943) but it was not until 1957, when Frank Rosenblatt at the Cornell Aeronautical Laboratory built the first implementation of an artificial neural network, or perceptron, that its potential for AI innovation became clear, starting the first AI summer (Rosenblatt 1958).

A perceptron is inspired by certain aspects of biological neurons. This ‘artificial neuron’ takes multiple input signals, each with an associated weight which represents the importance of that input. The inputs are then summed up, and if the total surpasses a certain threshold, the perceptron ‘fires’ or produces an output signal. Deep learning systems are made of perceptrons, or neural networks, which are assembled in multiple layers that progressively learn more complex features and representations of the training data that are provided as input. This layered learning helps the network better understand the underlying patterns in the data, leading to more accurate predictions. Essentially, the deeper the network, the more capable it becomes of handling complex and large-scale data by capturing subtle relationships that simpler models might miss. The capacity that these models have for open-ended learning and generalisation beyond training data has a clear effect on their possibility of generating novel output. This novelty can be interpreted not just in Boden’s ‘psychological’ sense but also in an ‘historical’ one. An example of this is when, in the late 2010s, the company DeepMind achieved a remarkable success in the domain of biology, with the AI programme AlphaFold, addressing the longstanding challenge of deciphering the three-dimensional structure of proteins and outperforming other methods by accurately predicting their structures (Service 2020).

Whether AI can be creative become a subject of public debate in the mid 2000s, thanks in particular to generative adversarial networks (GANs) and AlphaGo. Introduced in 2014 as a new kind of unsupervised generative algorithm, GANs generate high-quality, realistic data that mirrors the characteristics of the training set and found a particularly successful application in the field of style transfer and image synthesis (Goodfellow 2014). Developed by DeepMind, AlphaGo marked a pivotal advancement in the domain of board games. In 2016, around 200 million people watched live as AlphaGo defeated the world-master Lee Sedol in a tournament of the ancient game of Go, reaching international fame (Halina 2021; Silver 2017). These achievements drew considerable mediatic attention to a field that, until then, was mostly of interest only to researchers and technologists. With this renewed interest, scholars felt the necessity of going back to the old question: ‘Can a machine be creative?’

Currently, the field of research on creativity and AI broadly splits between those who are sceptical about the potential for AI to be creative, and those who instead do not exclude the possibility for AI to display creative properties.

The first group usually appeals to fundamentally human and social motives behind creativity that cannot be shared by

machines, for example, ‘human intent, inspiration, a desire to express something’. (Hertzmann 2018, 1) Sean Dorrance Kelly, in an article which became a manifesto of the sceptical views in respect to the possibility of AI to be creative, affirms: ‘We may be able to see a machine’s product as great, but if we know that the output is merely the result of some arbitrary act or algorithmic formalism, we cannot accept it as the expression of a vision for human good. [...] For this reason, it seems to me, nothing but another human being can properly be understood as a genuinely creative artist’. (Kelly 2019).

Novelty and surprise are not enough to attribute creativity to AI. Philosophers such as Berys Gaut and Mark Runco outline essential aspects of creativity, including intentionality, agency, and authenticity, contending that the challenge in acknowledging AI creativity on the same level of human creativity stems from AI’s lack of these attributes (Gaut 2010; M. Runco 2023). Runco ties intentionality to problem-finding (Csikszentmihalyi 1988), but it can be just as easily linked to the requirement of agency expressed by Gaut and other authors (Brainard 2023; Kieran 2014; Stokes 2008). Agency has, in fact, frequently been equated to the capacity of initiating events with an intention (Malafouris 2008). Autonomy, goal-directedness, accountability, reactivity, are only some of the many criteria that have been discussed in the literature, and according to which we should determine whom we should or should not attribute agency to (Moruzzi 2023; Schlosser 2019).³

Gaut defines creativity as ‘the capacity to produce original and valuable items by flair. So creativity [...] is a particular exercise of agency. As such it is open to agents, whether human or not, that have the requisite capacities’ (Gaut 2010, 1041). Not every kind of action performed by an agent can be classified as creative, but only the ones that exhibit a ‘relevant purpose’ (Gaut 2010, 1040). Lovelace’s objection, with which this paper opened, had agency as an implicit requirement, too. Indeed, the analytical engine was able to perform only following the instructions given by whoever was operating it. The agency of the human operator is, thus, essential for the machine to generate output.

In a recent article, M. Runco (2023) suggests an update to the bipartite Standard Definition of Creativity, which includes originality and effectiveness—which can be understood as ‘utility, appropriateness, or fit’ (M. Runco 2023, 1)—as key features (M. Runco and Jaeger 2012), in order to distinguish human from artificial creativity. Runco asserts that existing AI systems might meet the criteria for creativity under the Standard Definition. However, doubts persist regarding the potential for AI to exhibit creativity, particularly in a manner comparable to that of humans. Intentionality and authenticity are the two candidates that he selects as an addition to the Standard Definition of Creativity. The motivations given by Runco for the addition of authenticity to the Standard Definition, is threefold: due to (1) its role for self-actualisation, understood as a state in which an individual is true to themselves, expressing their genuine thoughts and feelings, (2) the necessity to broaden the applicability of the definition of creativity to non-Western cultures, where authenticity is considered as important as, or possibly even more important than, originality when it comes to creativity (M. Runco 2023, 1), and (3) to ‘the fact that authenticity is impossible for AI’ (M. Runco 2023,

1). This last claim, and Runco’s overall proposition to update the Standard Definition of creativity in order to account for the unlikelihood for AI to be creative, might be questioned as an example of the ‘AI effect’ that was mentioned earlier: as soon as researchers develop AI systems capable of displaying the features that we attribute to creativity, we promptly discount these accomplishments as lacking genuine creativity and alter the criteria for evaluation.

Lastly, even assuming that in future, more powerful, systems will be able to achieve properties such as agency, intentionality, and authenticity, some assert that we might still reject claims in favour of AI creativity on the basis of the fact that ‘Art is fundamentally a social interaction, and thus can only be made by social agents’. (Hertzmann 2018, 20).

Theorists who instead wish to support the possibility for AI to be creative may take two different routes, either arguing for a nonanthropocentric definition of creativity which does not include features that are paradigmatically and exclusively human (Moruzzi 2021; Newell, Shaw, and Simon 1962), or pointing at the impressive achievements in the field of AI semi-autonomous generation as a testimony to the fact that AI should be deemed ‘more than a tool’ (Mazzone and Elgammal 2019, 9). A more nuanced approach is taken by scholars who, although arguing that AI systems cannot be considered creative in themselves on the basis of similar reasons to the ones raised by the first group—for example, the lack of intentions and goals—acknowledge the potential of AI of opening up new opportunities for human artistic creativity (Anscomb 2022, 16). Even without envisioning a radical future of human–AI ‘anthrobotic’ hybridisation (Miranda 2020, 597), which combines the features and abilities of the two, these views welcome a reflection on how human–AI interaction in the creative field may enhance human creativity and innovation.⁴

Debates around creativity and AI gathered steam very recently, when, over the summer 2022, a new technology for artistic creation took the internet by storm: Generative artificial intelligence (GenAI). GenAI models have been leveraged by artists in their practices for much longer (Franco 2022), but only with large language models, such as OpenAI’s ChatGPT,⁵ and text-to-image systems, such as Midjourney or Stability AI’s Stable Diffusion,⁶ a wide and not necessarily computer-literate audience had access to this technology (Cetinic and She 2022; Epstein et al. 2023). The availability, user-friendly interface, and speed in producing output of an impressive level of quality, in comparison to what was being produced by AI technologies even just a few months prior, contributed to endowing GenAI with an aura of magic.

Although it is possible to push-back against the argument that these models produce anything that is ‘new’—as they regurgitate content that has been previously created (Doshi and Hauser 2024), the number of both academic research and media coverage that has focused on them undoubtedly vouches in favour of the fact that their outcomes can be considered ‘surprising’, insofar as they have provoked a reaction in the audience. The element of surprise that AI was lacking, seems now to have been achieved (Moruzzi 2020; M. Runco 2023).

3 | Navigating the Future of AI and Creativity

The impact of technology on creative processes is not a novelty brought about by AI. Both the fields of art and science have been transformed by technological innovations.

The invention of the telescope at the turn of 16th and 17th centuries is traditionally regarded as one of the most influential technological innovations in science (Helden 1977). It not only enabled the observation of previously unknown celestial bodies in the cosmos but also transformed the relation between the human and the universe.

The music industry is maybe the first creative industry where the impact of technology had an international resonance. Recording technology which started in the late 18th century with phonograph cylinders, gramophone records and, later on, electrical microphones, allowed for the reproduction and distribution of musical performances, altering the landscape of music consumption and the revenue models of the music sector. One of the most apparent consequences was the gradual replacement of live performances—and musicians—in a variety of contexts: from movie theatres to public events. This shift led to the emergence of recording labels as key players in the industry. Musicians sought to address the disproportionate power dynamics with record labels through various strategies, one of which was the creation of independent production and distribution channels to circumvent the traditional oversized control of record labels on artist promotion, production and sales. This gradual transformation was conducted in parallel to many other sectors of the cultural economy which were seeking more flexible and independent work arrangements—the so-called gig-economy model (Cloonan and Williamson 2023).⁷

The relationship between creativity and technological innovations forms a virtuous cycle, where the advancement of one element propels and stimulates the development of the other. This is evident, among many other examples, in the development of piano technology. Piano makers in the 18th and 19th century expanded the keyboard's range and the durability and stability of the instrument's frame to accommodate the creative demands of musicians such as Beethoven and Liszt who asked for a broader range of expression (Giordano 2016). Both fields benefited from the exchange: the technology of the instrument considerably improved, and musicians achieved the necessary means to allow for greater dynamic contrasts and nuanced playing.

GenAI technology is likely to have a similar kind of disruptive effect on the creative sector as the innovations just mentioned. At the same time, it has also the potential of furthering similar beneficial advancements in both science and the arts. Throughout history, the arts have consistently been at the vanguard in driving innovation, serving as a catalyst for pushing the frontiers of knowledge and inspiring transformative change across various domains. With the upsurge of GenAI techniques for the generation of creative content, artists are occupying yet again a pioneering position. Finding the right solutions for a responsible and constructive interaction between humans and AI in the field of artistic creativity, can therefore have rippling

effects in many other fields that are affected by the transformative impact of AI.

Still, one issue remains to be settled: how should we respond to the question 'Can machines be creative?' This is the question with which this paper opened and that does not seem to have found an answer, yet. The sceptics still have one argument up their sleeves: when attributing the capability to create novel and surprising material to AI, we are adopting a product-first account of creativity, namely, we are assessing the creativity of an agent or a process on the basis of the feature of the generated product (in this case, novelty and surprisingness) (Currie and Turner 2023; Gaut and Kieran 2018).

From a product-first perspective, arguing that AI can be creative is easier: AI can create novel output—for example, AlphaFold predicts structures of proteins that were previously unknown or not solved experimentally, ChatGPT generates strings of text that are contextually driven and not a mere repetition of the training data, and text-to-image models can synthesise visual elements in ways that were not explicitly seen in its training data—and this output is surprising as it is difficult to predict and it provokes a reaction in the audience. By arguing this, however, we are liable to a similar observation as the one raised by Minsky: 'no machine has been built which remains very impressive after careful study'. (Minsky 1956, 3) When switching from a product-first to a process-first account, other elements of creativity, such as intentionality, agency and autonomy, suddenly gain more relevance (Moruzzi 2021). AI is a tool that facilitates and enables the creation of something new and surprising, it is not the main driving force in the creative process. Hence, attributing creativity to AI from a process-first perspective is questionable.

In addition, one of the three features of creativity identified by Boden remains to be addressed: 'value'.⁸ Content generated by and through AI might be novel and surprising, but is it valuable? If we do not merely interpret value as endorsement by critics, galleries, record labels and the general public of the aesthetic merit of the products generated by AI (Paul and Stokes 2023), but instead, more broadly, as the promotion of human well-being and human flourishing (Woodruff 2001), then for AI to achieve this last property seems a less obvious task.⁹ Focusing on the concept of value, interpreted in the second way, also allows us to distance ourselves from the original question 'Can machines be creative?', and finding an answer to this question suddenly does not appear as the most urgent issue that we need to face. The impact that GenAI is having on different communities and sectors calls attention to the necessity of focusing less on theoretical questions, such as this one, and more on the social implications of the widespread adoption of GenAI (Steyerl 2023).

Just as the polarisation between 'Wonder and Panic' in response to the latest achievements in AI technology for the generation of content tends to obscure more urgent issues, such as the scraping of content for the training data, the lack of attribution to the original creators of the content, and the hidden labour that goes into the development of the dataset and into the moderation of the generated content (Goetze 2024; Sarkar 2023),¹⁰ so does the polarisation between the two sides of

the debate around whether AI can be deemed creative or not. Rather, it would be more fruitful to focus on how AI is changing creative processes and how we can act accordingly to prevent misuses of the technology from happening (Rafner et al. 2023).

Within the computational creativity and the human–computer interaction community, the mixed-initiative co-creativity field of study has this among its core aims. The mixed-initiative co-creativity paradigm was first presented in a paper in 2014 by Yannakakis, Liapis, and Alexopoulos (2014). It explores how human and computational agents can contribute to the generation of creative content by acting in synergy, examining the roles and interaction patterns between human users and computational systems in co-creative processes (Davis 2021; Deterding et al. 2017). This paradigm stands in the middle of a spectrum, between more traditional creativity support tools, such as computer-aided design (CAD), where the agency is in the hands of the human user, and computational creativity, where the artificial agent generally has more control over the process in an autonomous or semi-autonomous way. The increasingly widespread use of GenAI models is shifting the agency toward the artificial agent's side of the spectrum.

This shift may be responsible for a change in the views of thinkers who argue that AI cannot be creative on the basis of a lack of agency, where agency is understood as the capacity of autonomous control over its own actions. In the creative scenario, transformed by the widespread adoption of AI tools, it is urgent to investigate how the different balances of agency and control between humans and machines can change the user experience and perception in creative processes that are performed together with technology (Evans 2023). The call for an increased attention to the human–machine interaction, goes in the same direction as the reflections made by Anscomb (2022) and other researchers on the investigation of what it is that underpins the support that AI can provide to human creativity.

Agency attribution, in one or more of the interpretations of the term mentioned in Section 2, is essential also for the ascription of causal and legal responsibility, as it allows agents to distinguish events that they caused from those for which they are not responsible for. In the creative domain, this tightly relates to the attribution of intellectual property. Recent legal disputes over copyright claims over content generated with and by AI, including artists suing AI companies, and the Hollywood writers' strike advocating for guardrails against the use of AI by production studios, underscore critical apprehensions shared by creative communities about lost jobs and stolen labour in the digital art landscape.¹¹

In this scenario, philosophers are called to answer questions that are maybe narrower, but more immediately socially relevant than the question 'Can machines be creative?' And, in doing so, they necessarily need to widen their debates to include experts from other disciplines, from law, to computer science, psychology, design and the arts. Just as a synergy between creativity and technological innovation is key to prompt a virtuous cycle which benefits both fields, and the alignment between humans and AI is necessary for building a constructive co-creativity relationship, we need the combined effort of researchers, artists, professionals and enthusiasts to ensure that

'creativity' and 'AI' is a duo that inspires and prompts an enrichment of the human creative experience.

Conflicts of Interest

The author declares no conflicts of interest.

Endnotes

¹ This thought has been more recently echoed by the Google DeepMind principal research scientist Murray Shanahan (Shanahan 2020).

² In his 1950 paper, Turing affirmed that machines already took him by surprise 'with great frequency' (Turing 1950, 450), although he acknowledges, as Minsky does, that the surprise might be due to 'some creative mental act' (ibid., p. 451) on his part, rather than to the machine's capabilities.

³ Some key definition of agency that have been given in the philosophical literature can be found in Anscombe 1971; Bratman 2007; Davidson 1963; Kane 2011; Latour 2007.

⁴ For an overview on debates around creativity, see the Stanford Encyclopaedia of Philosophy entry by Paul and Stokes (2023).

⁵ OpenAI's blog post available at <https://openai.com/blog/chatgpt>.

⁶ Available at <https://www.midjourney.com/home?callbackUrl=%2Fexplore> and <https://stability.ai>.

⁷ And, indeed, the term 'gig' in gig-economy originally had its roots in the music industry, referring to individual musicians' live performances.

⁸ Value is discussed as a condition for creativity in Amabile (1996), Boden (2004), Carruthers (2011), Kieran (2014), and Novitz (1999), among others.

⁹ It should be noted that value is a contested requirement of creativity which scholars do not unanimously agree on. For a discussion on this, see Kind 2022, 25–27.

¹⁰ See Alan Warbuton's 'The Wizard of AI', a 20 minute, 99% AI-generated visual essay developed by Warbuton for the Open Data Institute's 2023 summit. Video available at: <https://theodi.org/news-and-events/news/wizard-of-ai/>.

¹¹ The copyright and legal disputes are covered here: <https://www.theguardian.com/commentisfree/2023/aug/26/ai-generated-art-copyright-law-recent-entrance-paradise-creativity-machine> and here: <https://www.theverge.com/2023/1/16/23557098/generative-ai-art-copyright-legal-lawsuit-table-diffusion-midjourney-deviantart>. Information about the Hollywood writers' strike available at: <https://www.wired.co.uk/article/us-writers-strike-ai-provisions-precedents>.

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Course Code: PIM9104

Knowledge-based Economy Social Management

Instructor: Assoc. Prof. Dr. Kuncharee Kakhai

**Management Innovation Program, College of Innovation and Management,
Suan Sunandha Rajabhat University Semester 1, Academic Year 2025**

Course Description

Theories and principles of knowledge-based economic society and development directions of the country; Principal pillars of knowledge-based economic society; Knowledge management; Educational Management and Training; Creativity and critical thinking and open innovation; Assessment of the state of knowledge-based economic society; Case studies from foreign countries and in the country.

- กิจกรรมขโมยไอเดีย
- สัปดาห์

Course Objectives

- 1. Design a model for the development of a knowledge-based economy by integrating theories, principles of knowledge management, education, innovation, creativity, and case studies to be consistent with the current and future contexts of the country.**
- 2. Develop strategic practices to promote a knowledge-based economy at the organizational or national level by using creative work skills, integrating knowledge, technology, knowledge management, and stakeholder participation.**
- 3. Demonstrate values and ethics in the process of developing a knowledge-based economy, focusing on public benefits, sustainability, transparency, and social responsibility, and convey such concepts into real-life practice or professional roles.**
- 4. Develop characteristics of citizens in the 21st century by adhering to the principles of morality, ethics, systematic thinking, creativity, working with others, and social responsibility to lead to creative participation in the sustainable development of the country's knowledge-based economy.**

Evaluation: 1.Academic writing

Students are required to choose one topic within the scope of the course and write an academic article that is approximately 10 pages long (excluding references). The article must include the following elements:

- **1.Title of article**
- **2. Abstract and Key words**
- **3. Introduction (1 paragraph)**
- **4. Content (must have internal reference at least 10 research papers published within the last 5 years, as well as at least 10 textbooks or articles, following APA citation style)**
- **5. Conclusion (1 paragraph)**
- **6. Bibliography (APA style)**

Example of Academic writing

Moruzzi, C. (2025) Artificial Intelligence and Creativity

Philosophy Compass <http://doi.org.10.111/phc3.70030>

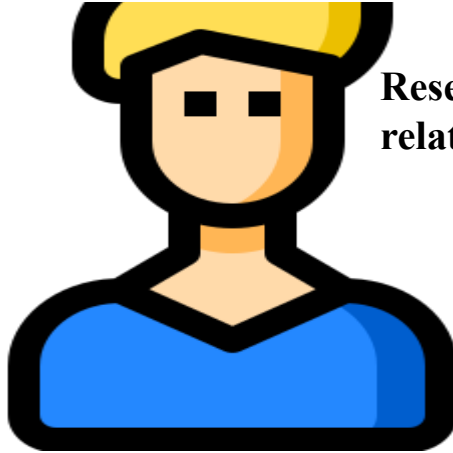
pp1-8

Obrom Aranyapruk (2022) *Strategies for Building a Knowledge-Based Economy for Community Enterprises in the Eastern Economic Development Zone* <https://doi.org/10.57260/rcmrj.2022.261618>

2. Paper exam

- **The assessment consists of three questions and must be completed within a specified time limit of three hours.**

**Background of work
and study**



**Research interests
related to your thesis**



Level of English communication skills.

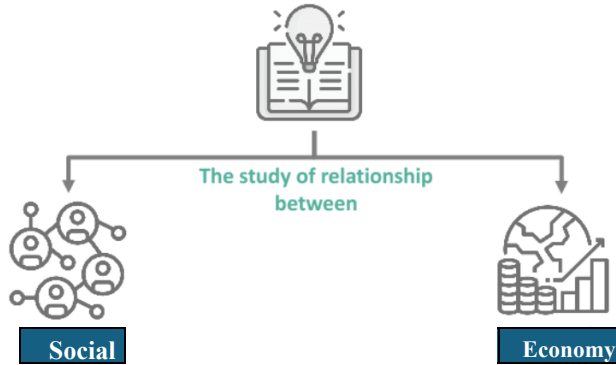
Module 1: Theories and principles of a knowledge-based economy and the direction of national development.

Learning Outcomes: Upon completion of this subject, learners will be able to:

1. Systematically identify the significance, key concepts, meanings, and components of a knowledge-based economy.
2. Examine the theories and principles associated with the development of a knowledge-based economy.
3. Compare case studies of countries that have successfully established a knowledge-based economy.
4. Analyze the development trajectory of Thailand's knowledge-based economy.
5. Recommend strategies for the sustainable growth of the Thai economy through the application of knowledge and innovation.

A framework for understanding and applying knowledge

What is social economy



Social is made up of people who share values, norms, culture, and family, school, and religion.

Resource production, consumption, exchange, and distribution comprise a nation's economy.



Social economy is the relationship between people's way of life (society) and their livelihood through production and consumption (economy).

Important components of social economy

Synopsis of Social Economy

Focus	Social objectives, sustainable development, and inclusive growth
Values	Solidarity, community, and social impact
Examples	Cooperatives, mutual societies, social enterprises, and non-profit organizations.
Key Characteristics	Social mission, Democratic governance, Reinvestment of profits
Goal	To create a more equitable and sustainable society through social and economic initiatives.

What is A Knowledge-based Economy?

A knowledge economy is one in which knowledge is created, acquired, transmitted, and used effectively by enterprises, organizations, individuals, and communities.

World Bank. (2007). *Building knowledge economies: Advanced strategies for development*. Washington, DC: The World Bank.

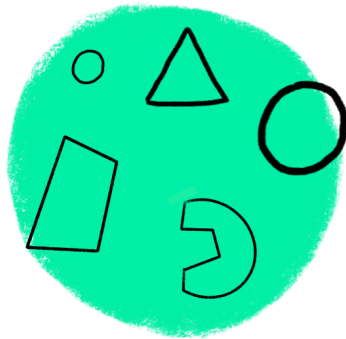
The knowledge-based economy is an expression coined to describe trends in advanced economies towards greater dependence on knowledge, information and high skill levels, and the increasing need for ready access to all of these by the business and public sectors.

(<https://ec.europa.eu/>)

A knowledge-based economy (KBE) is an economic system where knowledge, rather than traditional factors like land or labor, is the primary driver of growth, wealth creation, and employment. It focuses on the creation, distribution, and application of knowledge, emphasizing innovation, research, and a skilled workforce. (<https://www.adb.org/>)

Analysis

Breaking something down into parts



Synthesis

Combining separate elements into a whole



Group Activity 1: Create a theoretical definition of Knowledge-Based Economy (KBE) from three sources using different artificial intelligence programs.

A knowledge-based economy

Theoretical Definition

-

Why a Knowledge-Based Economy Matters

How to drive KBE: The World Bank Four Pillars of the KBE

The four pillars of the knowledge economy			
Pillar 1	Pillar 2	Pillar 3	Pillar 4
Economic and institutional regime	Education and skills	Information and communication infrastructure	Innovation system
A regulatory and economic environment that enables the free flow of knowledge, supports investment in ICT and encourages entrepreneurship is central to the knowledge economy.	An educated and skilled population is needed to create, share and use knowledge.	A dynamic information infrastructure-ranging from radio to the internet is required to facilitate the effective communication, dissemination and processing of information.	A network of research centers, universities, think tanks, private enterprises and community groups is necessary to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge.

(World Bank. 2018, Retrieved 18/03/2019 from <http://web.worldbank.org/>)

*Care why to
develop
knowledge-based
economy*

From Industrial to Knowledge-Based Economy

Key Characteristics of the KBE Shift

Synopsis of Knowledge-Based Economy

Focus	Intellectual capital, innovation, and knowledge-intensive activities
Values	Economic growth, technological advancements, and high-skilled workforce.
Examples	Technology companies, research institutions, and universities
Key Characteristics	Intellectual property, Skilled workforce, Information technology
Goal	To increase the value of goods and services through innovation and knowledge application

If poor countries want to develop towards KBE, what challenges must they face?

Examples of success practices and not yet

Success Practices	Not Yet
Estonia	Central African Republic – CAR
Vietnam	Niger



FIXED VS GROWTH MINDSET



“Not Yet” — The Most Important Mindset for Growth

- Developing a Growth Mindset with Carol Dweck- <https://lnkd.in/eTQdvki>

People with fixed mindsets believe that:

- Skills, intelligence and talents are natural.
- Failure is shameful and should be avoided.
- Some people are naturally good at things while others are not.
- You are not in control of your abilities.

Not necessary or useful

See effort as a negative thing and something you do when you're not that good.

Avoid

See effort as a negative thing and something you do when you're not that good.

Avoid

Get discouraged when making mistakes and avoid them.

Defensive

- Get defensive, take it personally.
- Ignores useful criticism/feedback.

Beliefs

People with growth mindsets believe that:

- You have the capacity to learn and grow your skills.
- Failure is a valuable lesson.
- People who are good at something are good because they build that ability.
- You are in control of your abilities.

Important part of the process

Focused on the process of getting better and consider different opportunities.

Embrace

More likely to embrace challenges and persevere moving forward.

Improve

See mistakes as learning opportunities and ways to improve.

Constructive

- Appreciate feedback and use it.
- Learns from criticism.

Effort

Challenges

Mistakes

Feedback

Estonia and Vietnam

Dimension	Estonia	Vietnam (Transforming)
Economic Drivers	Tech exports, e-governance, flat tax	State-led industrialization, FDI (Foreign Direct Investment) in manufacturing
Education Focus	Teacher autonomy, STEM, lifelong learning	Curriculum reform, Industry 4.0 integration
Innovation Ecosystem	Startup-friendly policies, Nordic investment	Government incubators, weak R&D spending
Key Challenges	Brain drain, energy security	Skills gap, infrastructure deficits

S – Science **T** – Technology **E** – Engineering **M** – Mathematics

STEM: An educational and skills development approach emphasizing the integration of knowledge across four fields to prepare individuals for a modern world driven by innovation, technology, and systemic problem-solving

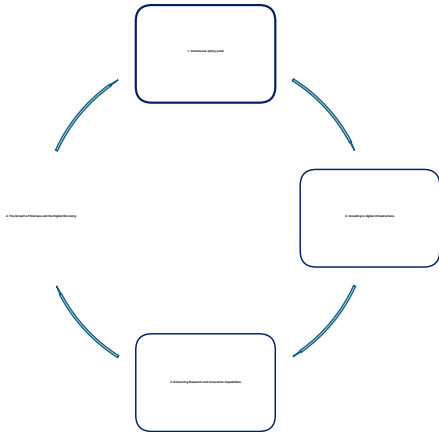
Success-Practice refers to a standard or set of guidelines known to yield positive outcomes when followed.

Key aspects of success practices

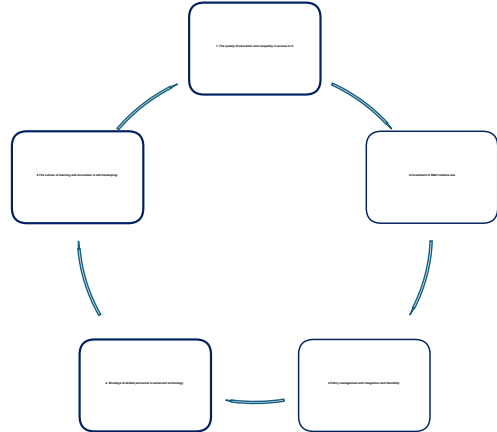
Hierarchy of Practices

Current State of Social and Economic Conditions in Thailand

Highlights of KBE development in Thailand

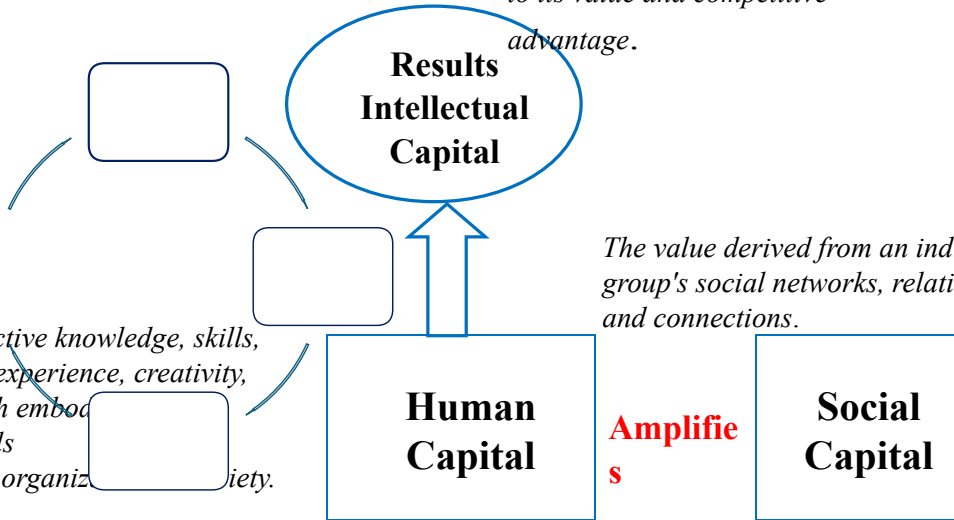


Major challenges



A broader idea behind KBE Theory

Intangible assets that contribute to its value and competitive advantage.

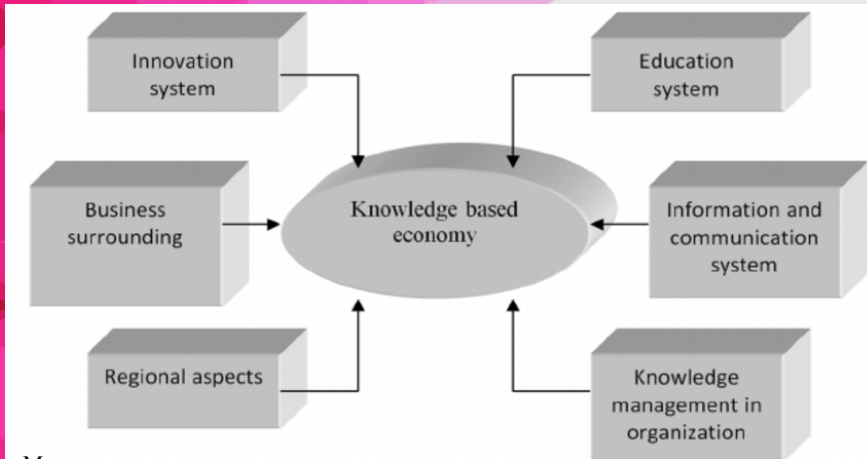


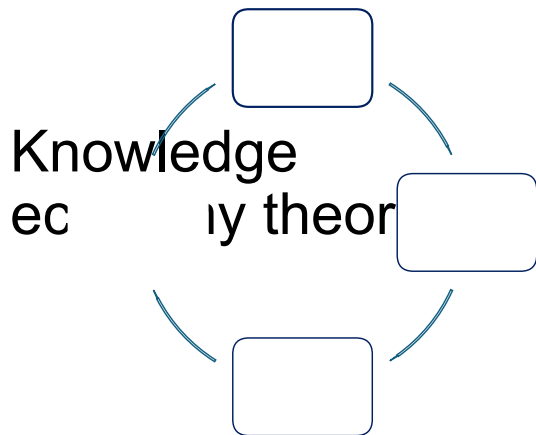
The collective knowledge, skills, abilities, experience, creativity, and health embodied in individuals within an organization.

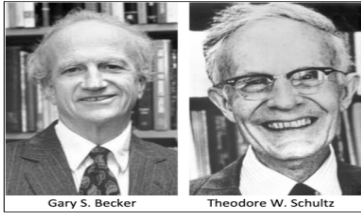
The value derived from an individual's or group's social networks, relationships, and connections.

The Knowledge-Based Economy (KBE) Theories

Knowledge is the key to creating economic value, especially in an age of information technology and innovation.

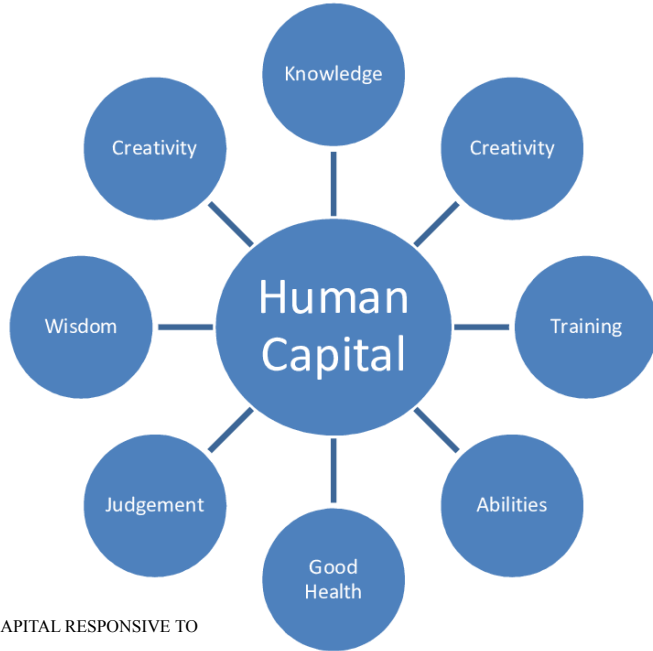






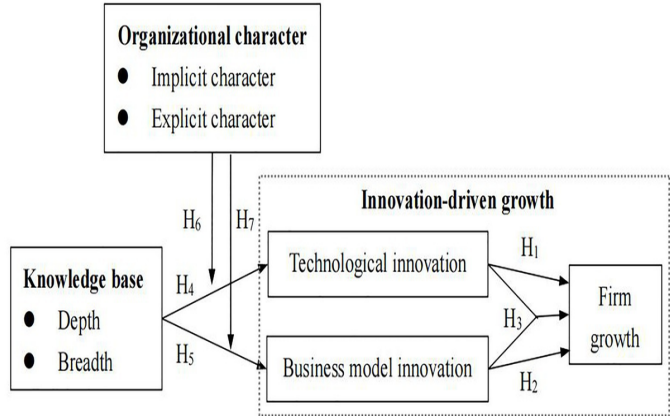
1. Knowledge as a Capital

Modern economies depend heavily on human capital



Zaric &Babi (2020) CREATING HUMAN CAPITAL RESPONSIVE TO REQUESTS OF SUSTAINABLE DEVELOPMENT GOALS: SOME EVIDENCE FROM SERBIA

2. Innovation-Driven Growth



Yu D and Yan H (2021) Relationship Between Knowledge Base and Innovation-Driven Growth: Moderated by Organizational Character. *Front. Psychol.* 12:663317. doi: 10.3389/fpsyg.2021.663317

3.Learning Economy

An economic system where learning serves as the primary mechanism for boosting productivity, fostering innovation, and competing in the global market.

Learn through childhood, work,
and retirement.

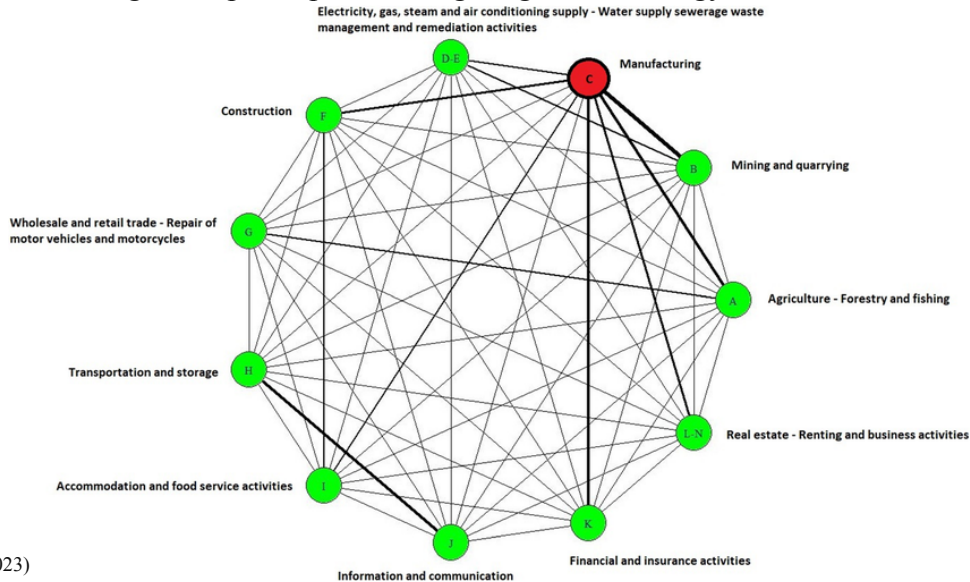
Reskilling / Upskilling

Lifelong Future
Learning Skills
R&D

**Critical Thinking,
Creativity,
Digital Literacy, AI &
Data Skills,
Entrepreneurship**

Linking universities – research centers – business sector

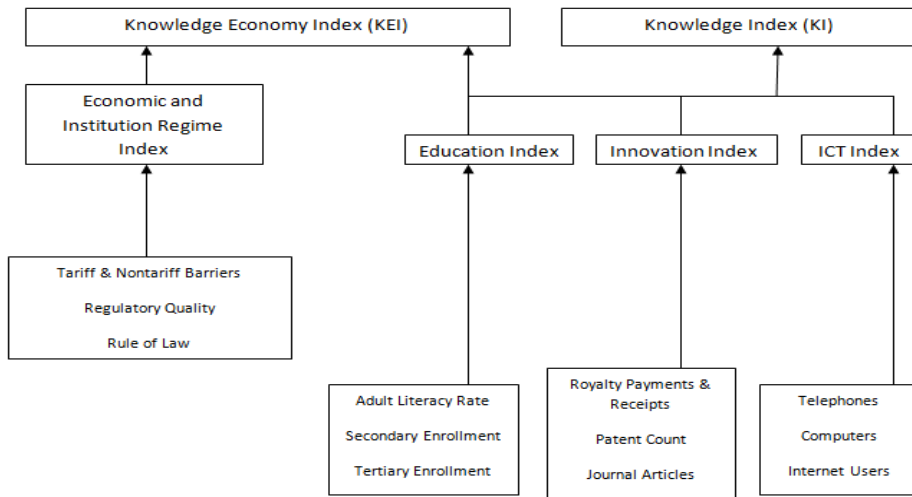
4. Networked Economy: An economic system that is driven by networks of information, knowledge, and participants through digital technology.



Daglis, et al, (2023)

Proposals for driving the developing country economy towards sustainable growth based on knowledge and innovation

How to assess knowledge-based Economy



The latest version of the World Bank framework was released in 2015.

The Global Innovation Index (GII)

Box Table 1 Economies with the most GII indicators ranked top, 2024

Economy	Inputs	Outputs	Total
Singapore	9	5	14
United States	3	6	9
China	3	5	8
Switzerland	3	4	7
Japan	3	3	6
Israel	4	2	6
Hong Kong, China	4	2	6
Luxembourg	5	1	6
Sweden	2	3	5
Republic of Korea	2	3	5
Iceland	3	2	5

Note: The GII methodology allows multiple economies to rank 1st on any one indicator; see Economy Profiles and Appendix I.

มรภ. ส่วนสุนทรว. นวัตกรรมจัดการ ป.เอก สาขานวัตกรรม

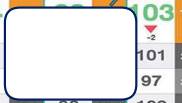


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อันดับนวัตกรรมไทยในอาเซียนย้อนหลัง 2014-2024



	สิงคโปร์	มาเลเซีย	ไทย	เวียดนาม	ฟิลิปปินส์	อินโดนีเซีย	บรูไน	กัมพูชา	ลาว	เมียนมา
2024	4 ▲ ₊₁	33 ▲ ₊₃	41 ▲ ₊₂	44 ▲ ₊₂	53 ▲ ₊₃	54 ▲ ₊₇	82	103 ▼ ₋₂	111 ▼ ₋₁	125
2023	5	36	43	46	56	61	82	101	110	125
2022	7	36	43	48	59	75	82	97	112	116
2021	8	36	43	44	51	87	82	109	117	127
2020	8	33	44	42	50	85	71	110	113	129
2019	8	35	43	42	54	85	71	98		
2018	5	35	44	45	73	85	67	98		
2017	7	37	51	47	73	87	71	101		
2016	6	35	52	59	74	88				
2015	7	32	55	52	83	97				
2014	7	33	48	71	100	87				





The "deep state" refers to a concealed, influential, and unelected faction within the government that allegedly seeks to control or subvert official policy.



A failed state is one that cannot ensure safety for its citizens, lacks effective government, and fails to provide services that the government

1. Obrom Aranyapruk (2022) **Strategies for Building a Knowledge-Based**

Economy for Community Enterprises in the Eastern Economic Development Zone <https://doi.org/10.57260/rcmrj.2022.261618>

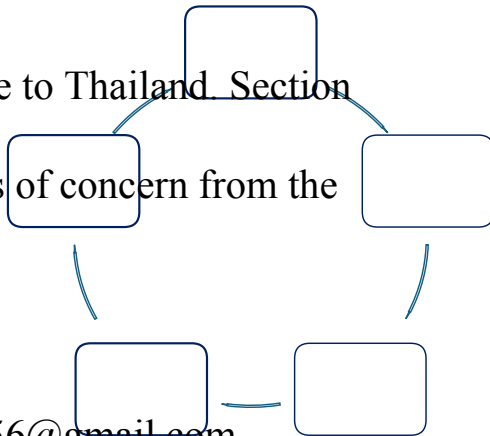
2. Bermeo Giraldo, M.C., Patiño Toro, O.N., Arias, A., Ben Arias, M.L., & Bran Piedrahita, L. (2022). **Research trends of the knowledge-based economy: A bibliometric study.** 290-313.

<https://doi.org/10.3926/ic.2048>

3. HADAD, S. (2017) **Knowledge Economy: Characteristics and Dimensions**

Assignment 2: At the end of Lesson 1, you are required to write a brief reflection note in one page divided into four sections

Section 1: Issues of particular importance to Thailand.
Section 2: Select a benchmark country.
Section 3: Strategies for addressing areas of concern from the benchmark country.



Please send all your assignments to kuncharee.ka3556@gmail.com

Module 1: Theory and principles of knowledge-based economic society and the country's development direction

What, why, how, care why

Before studying any subject, ask questions and seek answers until you grasp the concepts or feel satisfied. The main inquiries to consider are What, why, how, and leaders should include Care Why. Each unit's teaching sequence will adhere to these principles.

A Social Economy

Before the knowledge-based economy emerged, we had a social economy, which prioritized social benefits over profit and promoted sustainable and equitable economic growth. It focused on developing economic solutions to address social and environmental issues. A society consists of a group of individuals who share common values and norms, while the economy encompasses a country's production, consumption, exchange, and distribution of resources. The components of a social economy include natural resources, labor, the economic system, social structure, innovation, and technology. The Social Economy emphasizes social objectives, sustainable development, and inclusive growth, focusing on solidarity, community, and social impact.

A knowledge-based economy

A knowledge-based economy relies heavily on the ability to acquire information and transition from traditional industries to a digital economy. In this context, education and research and development (R&D) are crucial assets for countries aiming to increase their competitiveness in the global market. Key factors driving value creation include global economic competition, knowledge, and innovation. As the labor market increasingly demands specialized skills and knowledge, the reliance on traditional, natural, or unskilled labor is insufficient for sustaining economic growth. Education and life skills have thus become vital forms of "capital" for individuals. Additionally, effective government policies and a commitment to sustainable development are essential for fostering progress in this evolving landscape.

The World Bank, European Union, and Asian Development Bank each provide definitions for this term. To understand it academically, one should look for the term in textbooks, publications, and official documents from these organizations. When we encounter multiple definitions, it is essential to analyze and synthesize them to create our own definition based on these references. This process is known as developing a theoretical definition.

Definition Analysis and Synthesis

Definition analysis and synthesis involves breaking down existing definitions. This process consists of two key components: analysis and synthesis.

1. Analysis: This involves disassembling each definition to better understand its components. - Examine each definition*: Look closely at what each part of the definition means - Deconstruct the elements: Break apart the definition and consider how each piece is defined and how they are interconnected. - Evaluate consistency and discrepancies: Check for any inconsistencies or contradictions within the definitions.

2. Synthesis: After analyzing the definitions, the next step is to form a cohesive definition based on the analysis. This allows us to generate new perspectives and enhance existing definitions. Through this process, we can refine, develop, or create new definitions that provide a broader understanding.

Why KBE?

The global economy has undergone a swift shift from an industrial to a knowledge-based model in the 21st century. Knowledge, technology, and innovation increasingly create value and national competitiveness, replacing labor and basic commodities. Thus, knowledge management, continual learning, and innovation are crucial indicators of national, corporate, and individual economic development.

Thailand must adopt a knowledge-based economy to escape the middle-income trap and sustain economic and social development. Global economic, social, and technical transformations are driving the transition to a "knowledge-based economy," affecting economic structures, lifestyles, culture, and work patterns.

Transforming Society into a Knowledge-Based Economy

What strategy can we employ to transition society into a knowledge-based economy? Finland is a leading example of a successful knowledge-based economy, while Vietnam is achieving remarkable growth in Asia. Both countries have made significant advancements in education and human resources, established a robust innovation system, developed a digital information technology facilitation system, and maintained a stable political, governmental, and economic environment.

Why should we care?

As innovative and creative leaders who exemplify change for economic and social progress in our areas of influence, our role is often analyzed in the context of management innovation. Therefore, it is essential that we prioritize sustainable economic growth, global competitiveness, quality of life, job creation, and flexibility in all aspects of work and life.

A Social Movement

Western Europeans initially began as farmers but transitioned to an industrial society in the late 18th century, largely due to the English Industrial Revolution that started in the 1760s. This revolution introduced the steam engine, fundamentally transforming manufacturing and the workplace. Industrialization shifted life from rural areas to urban centers, resulting in significant economic, social, and cultural changes. After World War II, Asia began its own industrialization process. Japan was at the forefront of this movement, while Hong Kong, Singapore, South Korea, and Taiwan became known as the "Four Asian Tigers" due to their rapid economic growth. From the 1960s to the 1990s, these four East Asian economies experienced remarkable growth, especially as Western economies faced challenges. The term "Four Economic Tigers" reflects this unique phenomenon in Asia. In contrast, upper-middle-income and high-income countries typically take longer to advance from lower-middle-income status. For example, the United States took 93 years, Australia took 119 years, and the United Kingdom took 128 years to achieve significant economic growth. On average, economic growth in western countries takes about 100 years.

The East Asian economies advanced at a rapid pace, with Hong Kong reaching this status in 33 years, Singapore in 38 years, and both South Korea and Taiwan in 26 years. On average, these economies progressed within a range of 27 to 31 years. Thailand was referred to as the "5th Tiger of Asia" under Prime Minister General Chatchai Choonhavan, who shifted the focus from war to commerce. However, after two years, the country faced internal peace issues and the Tom Yum Kung economic crisis. Malaysia, Indonesia, and Vietnam, which share similar economic and social characteristics, experienced faster growth than Thailand. Currently, the Vietnamese economy is increasingly knowledge-based, both within Asia and globally.

Transition from Industrialization to a Knowledge Economy

The shift from an industrial society to a knowledge-based economy is complex. Firstly, conventional education is becoming outdated and does not meet the needs of society. Secondly, adapting to change requires a commitment to lifelong learning. Thirdly, information and innovation are key drivers of global competition. Additionally, businesses are utilizing fewer natural resources and are increasingly relying on cheaper labor. The pace of manufacturing, consumption, and communication is accelerating due to digital advancements. Moreover, future jobs will demand highly skilled talent. Finally, human capital plays a crucial role in fostering creativity and leveraging digital technology.

If impoverished and developing nations seek to become KBES,

What obstacles will poor and emerging nations confront in becoming knowledge-based economies? One, inadequate infrastructure for living; two, poor education; three, lack of research and innovation capital; four, lack of highly skilled workers; and five, poor governance.

Some good practices from disadvantaged countries

Estonia is a notable example of a country that has rapidly transitioned to a knowledge-based economy. These are its strengths: 1. Estonia is a leader in digital government. Most government services, including voting, taxes, and medical data, are available online. 2. STEM and digital skills: The state invests in STEM and digital skills from primary school. 3. Startup promotion: The e-Residency program, international entrepreneurs, and governmental investment help Estonia's startup ecosystem thrive. 4. Digital infrastructure: Estonia uses "X-

Road" to securely and effectively link agencies' data. 5. Private sector innovation: Skype was invented there, and it boasts the highest number of startups per capita in Europe.

Estonia is an example of a "knowledge-based economy" that integrates digital technology, public policy, and human capital development sustainably.

Vietnam is transitioning toward a knowledge-based economy with essential qualities, including: 1. Education investment: The Vietnamese government prioritizes STEM education and access to higher education. 2. Highly skilled labor: It has IT and digital education and talent for the IT industry. 3. Technology industry growth: Vietnam is Southeast Asia's IT and software hub, with numerous new enterprises and foreign investment. 4. National strategic programs, such as the "Vietnam Digital Transformation Program," drive the digital economy and innovation. 5. Public-private partnerships at universities and businesses support research and development (R&D) and innovation. Vietnam is transitioning from a manufacturing economy to a knowledge-based and digital one by focusing on education, worker skills, and technology and innovation.

Not Yet:

The Key Growth Mindset** The phrase "Not Yet" reflects an attachment to a growth mindset. It conveys that a task or goal is not currently accomplished but can be achieved in the future.

Practice: practice can be divided into five levels, ranging from individual learning to global learning exemplified through various examples. On the other hand, there is the concept of successful practice, which is not defined by levels. Evidence shows that success practice is effective, efficient, adaptable, and continually

Current Thai Social Image

Thailand's knowledge-based economy is currently in a transitional phase, moving away from dependence on resources and inexpensive labor toward one that is driven by innovation, technology, and knowledge. The main advantages and disadvantages are:

Thailand's Knowledge-Based Economy: Development Highlights and Challenges

Thailand is actively pursuing a policy aimed at fostering a 4.0 innovation economy. Key initiatives include: 1. Eastern Economic Corridor (EEC) Development Project: This strategic plan, aligned with Thailand 4.0, focuses on regional innovation through spatial development. 2. Digital Infrastructure Investment: The expansion of a nationwide 5G network is underway, along with the development of data centers, cloud platforms, and automation systems in major industries. 3. Research and Innovation Development: State universities and research institutes, such as the National Science and Technology Development Agency (NSTDA) and the National Research Council of Thailand (NRCT), are enhancing their roles in research and technology transfer. There has been a notable increase in Thai patents related to agricultural technology and health. 4. **Growth of Startups and the Digital Economy***: There is a rapid emergence of startups in sectors like fintech, Health tech, agritech, e-commerce, and digital payments. These areas underscore Thailand's commitment to advancing its knowledge-based economy, while also presenting various challenges to overcome.

Main challenges: 1. Education Quality and Inequality: Rural children often lack access to high-quality education, and many workers do not possess the skills required for the digital-age labor market. 2. Low R&D Spending: Thailand allocates only 1.3% of its GDP to research and development (R&D), significantly less than the 2-4% spent by South Korea and Singapore. Many private industries still undervalue investment in innovation.

The concept behind the knowledge-based economic theory

A knowledge-based society is shaped by three key components: human capital, social capital, and intellectual capital. First, social capital strengthens human capital, which then leads to the development of intellectual capital. This progression ultimately transforms society. Researchers have expanded on these three primary types of capital to establish the main concepts necessary for developing a knowledge-based economy in various countries. For instance, Zwiefka and Nycz (2013) examined this concept in Poland.

Knowledge-Based Economy Society Theory

The knowledge-based economy society theory consists of four primary components:

1. Human Capital: The first component emphasizes that a knowledge-based economy relies on human capital. Factors such as knowledge, creativity, education, abilities, good health, judgment, and wisdom are interconnected. These elements contribute to a person's value and their ability to produce, develop, and drive the modern economy.

2. Innovation-Driven Growth: The second component illustrates the relationship between innovation and

economic growth. An effective "innovation ecosystem," which includes education, research, business, government support, and information and communication technology (ICT) infrastructure, enhances worker productivity, provides higher-value goods and services, and strengthens global competitiveness. The success of innovation and economic prosperity depends on these factors. Additionally, research indicates that innovation is essential for firm growth and overall economic development.

3. Learning economy values skills and information, especially future talents. Lifelong learning comprises formal and informal learning, intelligent knowledge utilization, and R&D for innovation and issue solutions.

4. Networked Economy This diagram depicts how digital technology affects economic sectors, with "Manufacturing" at the center. Red circles (C: Manufacturing): The core, strongly connected manufacturing sector. The green circles represent different economic sectors such as Link lines: Show the interaction or dependency between sectors, with thicker lines suggesting increased influence, such as the manufacturing sector's substantial links to many others.

Society for Sustainable Growth:

1. Strong Innovation Ecosystem and R&D Investment: Research and development lie at the heart of the knowledge-based economy, driving the creation of new knowledge. 2. Human Capital Development with Future Talent: To apply knowledge and foster innovation, organizations need personnel equipped with the skills, knowledge, and abilities required for the future. 3. Promotion of AI and Digital Technology Across Various Sectors: Artificial intelligence and digital technologies enhance efficiency, create new opportunities, and transform all sectors of the economy. 4. Support for Targeted and High-Potential Industries: Businesses based on knowledge and advanced technology are essential for stimulating economic growth and adding value. 5. Fostering Sustainable Growth: When these components work in harmony, economic growth not only generates value but also takes long-term sustainability into account. This is the ultimate objective of a knowledge-based society and economy.

Knowledge-Economy Society assessment by the World Bank

Use two primary indexes: 1. Knowledge Economy Index (KEI): a composite index of the knowledge economy. It considers the Economic and Institutional Regime Index, which includes Tariff and Nontariff Barriers, Regulatory Quality, and the Rule of Law. KEI's key component is Knowledge Index (KI). 2. Knowledge Index (KI): Indicates the country's knowledge potential. It has three subindices: The Education Index measures adult literacy, secondary enrollment, and tertiary enrollment. The Innovation Index tracks royalties, patents, and journal articles. The ICT Index measures the number of phones, computers, and internet users.

This graphic illustrates that the World Bank assesses the knowledge economy based on economic and institutional conditions, as well as knowledge potential, which is evaluated through education, innovation, and ICT use. No further assessments have been conducted since 2015, although alternative indicators have been employed.

Index of Global Innovation

This image represents the Global Innovation Index, an annual report compiled by WIPO and its partners, which ranks and evaluates countries' innovation performance. The index examines inputs (institutional environment, human capital, and research) and outputs (creative and innovative products) to help countries assess their innovation strengths and weaknesses and develop policies to boost innovation-driven economic growth. The graphic shows global rankings. The final graphic displays the ASEAN countries from 2013 to 2024.

Suggested papers

1. Obrom Aranyaprak (2022) Strategies for Building a Knowledge-Based Economy for Community Enterprises in the Eastern Economic Development Zone <https://doi.org/10.57260/rcmrj.2022.261618>
2. Bermeo Giraldo, M.C., Patiño Toro, O.N., Valencia Arias, A., Benjumea Arias, M.L., & Bran Piedrahita, L. (2022). Research trends of the knowledge-based economy: A bibliometric study. *Intangible Capital*, 18(2), 290-313. <https://doi.org/10.3926/ic.2048>
3. HADAD, S. (2017) Knowledge Economy: Characteristics and Dimensions Management Dynamics in the Knowledge Economy Vol.5 (2017) no.2, pp.203-225; DOI 10.25019/MDKE/5.2.03 <https://core.ac.uk/>

Lecture Summary for Students: 1 Theory and principles of knowledge-based economic society and the country's development direction July 2025; SSRU, College of Innovation Management, PH.D. Innovation Management

Module 1 Course Orientation: Theories, and principles of a knowledge-based economic society, as well as national development strategy.

Learning Objectives

After studying about the theories and concepts of the knowledge-based economy and the country's development path, students will be able to:

1. Design a model for the development of a knowledge-based economy by integrating theories, principles of knowledge management, education, innovation, creativity, and case studies to be consistent with the current and future contexts of the country.

2. Develop strategic practices to promote a knowledge-based economy at the organizational or national level by using creative work skills, integrating knowledge, technology, knowledge management, and stakeholder participation.

3. Demonstrate values and ethics in the process of developing a knowledge-based economy, focusing on public benefits, sustainability, transparency, and social responsibility, and convey such concepts into real-life practice or professional roles.

4. Develop characteristics of citizens in the 21st century by adhering to the principles of morality, ethics, systematic thinking, creativity, working with others, and social responsibility to lead to creative participation in the sustainable development of the country's knowledge-based economy

Session	Content	Learning Activities	Duration of time
1	Course Orientation	Conversation, reviewing documents, asking questions, and learning agreements.	60 minutes

2.	Self-Introduction	Briefly introduce yourself	50 minutes
3.	Importance and definition of KBE	Experiment with AI to create meaning.	60 minutes
4.	Pillars of KBE	Lectures, sharing experiences	60 minutes
5.	Current situation of KBE	Cases from students' personal or professional experiences	60 minutes
6.	Case studies from countries with best practices	Group discussion bases on reading materials or real experiences	60 minutes
7.	Summary and assignment	Reflect on learning	10 minutes

Summary and reflection sheet after the lesson (Please complete it during class)

Section 1: What you learned today.

Section 2: Summary of that information

Section 3: Your reflective comments

Assignment: write a brief reflection note on one page divided into three sections

Section 1: Issues of particular importance to Thailand.

Section 2: Select a benchmark country.

Section 3: Strategies for addressing areas of concern from the benchmark country.

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