



STRATHMORE UNIVERSITY
SCHOOL OF COMPUTING & ENGINEERING SCIENCES
COURSE: Masters in Sustainable Energy Transitions
Final Examination
MSSET 8301: INNOVATION & ENTREPRENEURSHIP

DATE: April 29th, 2026

TIME: 18.00-20.30

General Instructions

1. This is a supervised exam
2. Exam duration: 2½ hours
3. You are expected to work independently
4. Answer **Any Five** Questions

QUESTION 1: National Innovation System & Managing Risk (20 Points)

Innovation is a process that involves an enormous amount of uncertainty, human creativity and chance and hence risk. Recent research shows that a majority of innovation projects fail or make little or no contribution to organizational goals.

a) The Kenya's national innovation system was created by the Science Technology and Innovation (ST&I) Act 2013. The Act created three institutions within the Ministry of Education, Science and Technology to make the innovation system. These institutions include the National Commission for Science, Technology and Innovation (NACOSTI), the Kenya National Innovation Agency (KENIA) and the National Research Fund (NRF). Examine the role of national innovation system and the type of risks the system is expected to minimize in order to foster successful innovation in the country. **(10 Points)**

b) One of the functions of Kenya National Innovation Agency (KENIA) in the STI Act (2013) is the initiation and creation of science and innovation parks and incubators. What is the role of business incubators? How do incubators enhance the process of innovation and entrepreneurship? What is the contribution of incubators to the national innovation system? **(10 Points)**

QUESTION 2: Dynamics of Innovation: Driverless Car Technology (20 Points)

Typically, the process of innovation moves from the fluid to the transition and finally to the specific phase. During the fluid phase a great deal of change takes place but the outcome is highly uncertain in term of production, process, firm leadership and structure, and management. The process changes from fluid to transition phase which marks the start of fast growth. The acceptance of the innovation is pretty much assured and the focus of firms starts to shift from inventor's workbench to the factory floor. The

following is an excerpt regarding development in the autonomous car technology. Read the excerpt and respond to the questions that follow.

Driverless car, also known as autonomous car, self-driving car or robotic car (robo-car), is a car that is capable of traveling without human input. Autonomous cars use sensors to perceive their surroundings, such as optical and thermographic cameras, radar, lidar, ultrasound/sonar, GPS, odometry and inertial measurement units. Control systems interpret sensory information to create a three-dimensional model of the vehicle's surroundings. Based on the model, the car then identifies an appropriate navigation path and strategies for managing traffic controls such as stop signs and obstacles. Once the technology matures, autonomous vehicles are predicted to disrupt the automotive industry, health, welfare, urban planning, traffic, insurance, labor market, and other fields. Autonomy in vehicles is often divided into six levels, according to a system developed by Society of Automotive Engineers (SAE). The SAE levels can be roughly understood as Level 0 – no automation; Level 1 – hands on/shared control; Level 2 – hands off; Level 3 – eyes off; Level 4 – mind off, and Level 5 – steering wheel optional. As of April 2023, vehicles operating at Level 3 and above are insignificant in the market. Waymo became the first company to offer driver-less taxi rides in December 2020 in a part of Phoenix, Arizona. In March 2021, Honda was the first manufacturer to sell a legally approved Level 3 car. Nuro began autonomous commercial delivery operations in California in 2021. In December 2021, Mercedes-Benz received approval for a Level 3 car. In February 2022, Cruise became the second service provider to offer driver-less taxi rides to the general public, in San Francisco. In December 2022, several mainstream manufacturers had scaled back plans for self-driving technology, including Ford and Volkswagen.

- a) Explain the concept of dominant design as the innovation process moves from fluid phase to transition phase using the case of autonomous car technology. What will be the impact of the dominant design on overall growth of the autonomous car technology and industry? **(10 Points)**
- b) Using the case of the automotive industry, discuss why changes in product and process become increasingly difficult as the innovation process moves through the transition to specific phase. What are the implications of the disruptive autonomous car technology on the automotive industry? **(10 Points)**

QUESTION 3: Role of AI Innovations in Renewable Energy Transitions (20 Points)

The following is an excerpt from Forbes Magazine regarding the role of Artificial Intelligence (AI) in Renewable Energy Transitions. Read the excerpt and respond to the questions that follow.

Artificial Intelligence: Accelerating Clean Energy Transformation, By Martin Hermann, Forbes, November 7, 2023. There has been a global surge in the urgency to transition to clean, sustainable sources of power. However, designing, developing, optimizing and integrating these green energy sources into existing power infrastructure presents a unique set of challenges. As the share of renewable power increases in the

electric grid, these challenges will continue to grow. Recent technological breakthroughs including artificial intelligence (AI) have brought us to a point where sustainable clean energy transitions are finally taking shape on a global basis. Indeed, recent hearings in the U.S. Congress have highlighted issues regarding rapid advance of AI across various industries. What has not received much attention, however, is this technology's immense potential for enabling clean energy transition globally.

a) Identify and discuss in detail the possible potential approaches through which artificial intelligence can be used in enabling the development, deployment and widespread adoption and use of renewable energies. **(10 Points)**

b) Considering the role of Artificial Intelligence (AI) in Renewable Energy Transitions explain why major innovations come from outsiders and not industry players whenever there is breakpoint in technology. For example, despite Kenya Power talking about using modern technologies including AI to address frequent power failures and blackouts, it is unlikely to come up with new approaches using these technologies to improve service to its customers. **(10 Points)**

QUESTION 4: Sources of Innovation (20 Points)

The overwhelming majority of innovations exploit change. There are some innovations that in themselves constitute a major change, such as the Internet. But these exceptions are fairly uncommon. Most successful innovations are far more ordinary and they exploit change. Thus, the discipline of innovation which is the knowledge base of entrepreneurship is a diagnostic discipline: a systematic examination of the areas of change that typically offer entrepreneurial opportunities.

a) The “unexpected success,” “unexpected failure” and “unexpected outside event” are sources of change that offer entrepreneurial opportunities and hence the most important sources of innovation that originate from within and outside of the enterprise. Discuss in detail why the “unexpected” is such a powerful source of innovation. Why are large firms more likely to benefit in innovations from “unexpected outside event?” **(10 Points)**

b) As an external source of innovations, knowledge-based innovations are the super-stars of entrepreneurship and get the most publicity, money and attention. Examine in detail these types of innovations focusing on their characteristics and why they may be considered the most challenging. **(10 Points)**

QUESTION 5: Funding of Innovations (20 Points)

The following is an excerpt regarding M-KOPA, a fintech platform that promises to make financing for everyday essentials accessible to everyone. Read the excerpt that focuses on funding of the fintech and respond to the questions that follow.

M-KOPA is a fintech platform that combines the power of digital micropayments with the Internet of Things (IoT) to provide customers with access to productive assets. With operations in Kenya, Uganda, Nigeria and Ghana, the company has expanded its model beyond solar products to include smartphones, electric motorbikes, cash loans and health

insurance. Leveraging its advanced connected credit platform, M-KOPA has deployed over \$1 billion in products and credit to millions of underbanked customers in Africa. MKOPA has received various rounds of funding with its largest \$255 million from Standard Bank in 2023 and latest \$160 million from Sumitomo in July 2025.

a) New enterprises normally face funding challenges and founders have to go out there and solicit money to develop their businesses. The main tool for seeking funding is a business plan which is the roadmap for the business. Consider the growth stages of MKOPA, analyze its funding requirements and highlight how the company's business plan may look as it grows. Which stage of MKOPA business may present the most funding challenges? **(10 Points)**

b) Explain with the help of illustrations the financing continuum for MKOPA as it grows from concept stage to a mature corporation emphasizing the role of public financing. **(10 Points)**

QUESTION 6: Global Innovation Index (GII) & Income Level (20 Points)

The Global Innovation Index (GII) categorizes countries and regions according to their innovative capacity. **Table Q6** below presents countries in the top 10 in the Global Innovation Indexes for 2024 & 2025 with an indication of their income levels, high income (HI) and middle income (MI). From the ranking it is clear that most countries in the top 10 are in the high income category and remain more or less the same over the two years.

Table Q6: Global Innovation Index (GII) (2024 & 2025)

Rank 2024	Country	Income Level	Rank 2025	Country	Income Level
1	Switzerland	HI	1	Switzerland	HI
2	Sweden	HI	2	Sweden	HI
3	USA	HI	3	USA	HI
4	Singapore	HI	4	South Korea	HI
5	United Kingdom	HI	5	Singapore	HI
6	South Korea	HI	6	UK	HI
7	Finland	HI	7	Finland	HI
8	Netherland	HI	8	Netherlands	HI
9	Germany	HI	9	Denmark	HI
10	Denmark	HI	10	China	MI

a) Using the innovation indexes for 2024 & 2025 provided in **Table Q6**, it is clear that these top innovators are also rich countries. Discuss the consequences of poor innovation ranking for a country. **(10 Points)**

b) Explain the role governments can play in determining the innovation index for countries. From **Table Q6** most countries in the top 10 in the Global Innovation Index are also in the high-income category. Can we then conclude that these countries are top innovators every year because they are rich and have money to spend on innovation activities? **(10 Points)**