



STRATHMORE UNIVERSITY

SCHOOL OF COMPUTING & ENGINEERING SCIENCES

MSSET 8301: INNOVATION & ENTREPRENEURSHIP

Date: August 17th, 2023

Time: 18:00-20:30 Hours

General Instructions

1. This is a supervised exam
2. Exam duration: 18.00 – 20.30 Hours
3. You are expected to work independently
4. Answer *Any Five* Questions

QUESTION 1: Innovation Process & Risk (20 Points)

The process of innovation may involve incremental, radical, or revolutionary changes in products, processes, organization structure or even thinking. The following is an excerpt regarding MPesa, a mobile phone money service innovation by Safaricom that has grown to be a dominant player in the money transfer market in Kenya. Read the excerpt and respond to the questions that follow.

MPesa is a mobile phone-based money transfer service, payments and micro-financing service, launched in 2007 by Vodafone Group plc and Safaricom, the largest mobile network operator in Kenya. MPesa allows users to deposit, withdraw, transfer money, pay for goods and services, access credit and savings, all with a mobile device. The service allows users to deposit money into an account stored on their cell phones, to send balances using PIN-secured SMS text messages to other users, including sellers of goods and services, and to redeem deposits for regular money. Users are charged a small fee for sending and withdrawing money using the service. MPesa has spread quickly, and by 2010 had become the most successful mobile-phone-based financial service in the developing world.

- a) Using examples from technology such as mobile phones, discuss what may be considered incremental, radical, or revolutionary innovations. Which category will you place the Mpesa innovation and why? **(10 Points)**
- b) Launching MPesa in 2007, Safaricom was putting a new innovation in the market with no idea whether it will succeed or not. Using this case of Mpesa discuss the statement “entrepreneurship is about taking risk.” **(10 Points)**

QUESTION 2: Global Innovation Index (GII) (20 Points)

Table Q1 below presents African countries within the top 100 in the Global Innovation Index (GII) 2020. The Global Innovation Index categorizes countries and regions according to their innovative capacity. To rank the countries, the index measures both innovation inputs and outputs. From the ranking of 2020 African countries start with Mauritius at number 52 and only nine (9) countries are in the top 100 including Kenya which is ranked at number 86.

Table Q1: Global Innovation Index (2020)

Rank	Country	Overall Score	Input (0-100)	Output (0-100)	Innovation Efficiency (%)
52	Mauritius	34.35	45.77(47)	22.94(60)	50
60	South Africa	32.67	44.85(49)	20.48(68)	46
65	Tunisia	31.21	38.98(78)	23.44(59)	60
75	Morocco	28.97	37.52(85)	20.42(69)	54
86	Kenya	26.13	35.02(92)	17.22(78)	49
88	Tanzania	25.57	30.41(112)	20.73(67)	68
89	Botswana	25.43	38.09(84)	12.77(105)	33
91	Rwanda	25.06	38.59(79)	11.52(112)	30
96	Egypt	24.23	31.91(104)	16.55(82)	52

a) The GII ranking of 2020 shows that Mauritius performs best among African countries with innovation inputs at 45.77% and outputs at 22.94%. Examine the inputs sub-index for Mauritius and Kenya which scores 35.02% and compare their performance. What's the role of government in the two countries and how have they performed in determining each country's inputs sub-index and hence GII? **(10 Points)**

b) The innovation efficiency ratio values are shown in Table Q1 what is the relevance of these values in ranking countries in the Global Innovation Index. The innovation efficiency ratios for Kenya and Rwanda are shown as 49% and 30% respectively what are the implications of these ratios for the two African countries? **(10 Points)**

QUESTION 3: National Innovation System and 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 make little or no contribution to organizational goals or fail. Business incubation is a form of intervention that may be used to reduce the high failure rate of innovations.

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 systems in minimizing risk and fostering successful innovation in a country. **(10 Points)**

b) Discuss in detail the role of business incubation in the innovation and entrepreneurship process. Analyze how incubators contribute to the national innovation systems by reducing uncertainty and risk thus allowing start-up businesses to grow. **(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 are exceptions and 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) Discuss in detail the “unexpected” and the “incongruity” as two of the most important sources of innovation that originate from within the enterprise. **(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: Dynamics of Innovation – Electric Car Technology (20 Points)

Typically, the process of innovation follows the S-growth curve which moves from start-up phase to rapid growth and eventually to decline in the mature phase. During the start-up phase a great deal of change in the product takes place but the outcome is highly uncertain in term of production, process, firm leadership and structure, and management. The process changes from start-up to growth 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 electric vehicle technology. Read the excerpt and respond to the questions that follow.

Electric vehicle car (EV), battery electric vehicle (BEV) or all-electric vehicle (AEV) is an automobile that is propelled by one or more electric motors, using only energy stored in batteries. Compared to internal combustion engine (ICE) vehicles, electric vehicles are quieter, have no exhaust emissions, and lower emissions overall. Charging an electric car can be done at a variety of charging stations and these stations can be installed in both houses and public areas. Many countries have established government incentives for plug-in electric vehicles while others have legislated to phase-out sales of fossil fuel cars, to reduce air pollution and limit climate change.

Tesla Model 3 became the world's all-time best-selling electric car in early 2020, and in June 2021 became the first electric vehicle to pass 1 million global sales. Together with other emerging automotive technologies such as autonomous driving, connected vehicles and shared mobility, electric cars form a future mobility vision called Autonomous, Connected, Electric and Shared (ACES) Mobility.

a) Explain the concept of dominant design as the innovation process moves from start-up phase to growth phase using the case of electric vehicle technology. What will be the impact of the dominant design on overall growth of the electric vehicle 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 growth to mature phase. What are the implications of the disruptive electric vehicle technology on the automotive industry? **(10 Points)**

QUESTION 6: Diffusion of AI Innovations (20 Points)

The following is an excerpt regarding ChatGPT and how the startup entered the artificial intelligence (AI) market and taken the space by storm. Read the excerpt and respond to the questions that follow.

ChatGPT is an artificial-intelligence (AI) chatbot developed by OpenAI and launched in November 2022. It is built on top of OpenAI's large language models (LLMs) and has been fine-tuned (an approach to transfer learning) using both supervised and reinforcement learning techniques. ChatGPT was launched as a prototype on November 30, 2022. It garnered immediate attention and large following for its detailed responses and articulate answers across many domains of knowledge. In a matter of days, ChatGPT had over one million users by December 4, 2022 and by January 2023, it had reached over 100 million users, making it the fastest growing consumer application to date with an estimated valuation of US\$29 billion. The advent of ChatGPT and its introduction to the public has increased interest and competition in the AI space. In February 2023, Google finally introduced its experimental chatbot known as "Bard." Also in February, Facebook parent company Meta, released its own chatbot LLaMA. The Chinese corporation Baidu released in March 2023 a ChatGPT-style service called "Ernie Bot." The South Korean search engine firm Naver announced in February 2023 that they would launch a ChatGPT-style service called "SearchGPT" in Korean in the first half of 2023. The Russian technology company Yandex announced in February 2023 that they would launch a ChatGPT-style service called "YaLM" in Russian before the end of 2023.

a) With the help of sketches, discuss the possible growth stages of ChatGPT in the AI market, from its founding, growth and eventually taking OpenAI to IPO. What is ChatGPT's current growth phase? **(10 Points)**

b) Analyze the case of ChatGPT and explain why major innovations come from outsiders and not industry players whenever there is breakpoint in technology. For

example, Google has been talking about AI for decades, and yet OpenAI, an upstart company, has taken the market by storm with its ChatGPT leaving Google gasping for air? **(10 Points)**