

MBAB 821

TECHNOLOGY MANAGEMENT

Faculty of Economic and Management Sciences

Study Guide

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North-West University

Compiled by Dr Kaizer



It all starts here

- Ranked in the top 5% of universities globally by the QS-rankings
- Contribute the second largest number of graduates annually to the labour market

Dit begin alles hier

- As een van die top 5% universiteite wêreldwyd deur die QS-ranglys aangewys
- Lewer jaarliks die tweede meeste graduandi aan die arbeidsmark

Gotlhe go simolola fano

- Re beilwe mo gare ga diyunibesiti tse 5% tse di kwa godimo go ya ka peo ya maemo ya QS
- Ngwaga le ngwaga go abelwa palo ya bobedi ka bogolo ya badiri mo maketeng ya badiri

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Module information

Module code	MBAB 821
Module credits	12
Module name	Technology Management
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Purpose and structure of this study guide

This study guide, as the name suggests, is not a text book or a set of lecture notes that a student should use to understand the content and pass the module. It is a set of guiding principles that should assist students with the planning for, adoption of, and deployment of technology to stay ahead of the pack. The guide points to a prescribed text book but several other resources such as technical papers, journal papers and conference papers are included in order to enrich the learning an experience of the MBA student. The lectures will be both formal and informal, case studies and papers will be discussed and the student is encouraged to study ahead before coming to the class.

Introduction to the module

The focus of the course is on the key concepts, models, and methods that enable manager to effectively manage the development and utilization of technologies. The goal is to develop an awareness of the range, scope, and complexity of the phenomena, issues, and problems related to economics and management of technology and technological innovations. The course will mainly focus on the micro issues but it will extend the discussion to cover macro issues of technology management by studying how industries and firms are transformed by new technologies, how new industries are formed, and what factors affect the innovation performance. In other words, a systems perspective will be used to develop insights into the conditions under which particular structural arrangements and systems are likely to facilitate technological development. In short, students will develop a better understanding of the complex issues surrounding the managerial tasks with respect to technology.

Learning in place

The students must satisfy the requirements of studying for MBA in Business Administration as prescribed in the North-West University MBA, Graduate School Handbook, for them to be admitted in this course.

Learning activities

- The module consists of a mixture of taught lectures which will equip students with the necessary theoretical grounding to use technology to gain advantage by causing disruption. Class discussions will be used to solve selected real-life problems as found in organizations. Groups will also be presented with scenarios to be discussed and will then be expected to provide the whole class with feedback.
- The lecturer will provide details as are essential to motivate the students and give them insight into the scope of activities envisaged in the module so that, students, on their OWN, can start collecting or organizing relevant materials and information ahead of time.
- Students can contact the lecturer by email, Zoom or make an appointment to discuss their progress or to have any academic query attended to. For extra academic mentoring such as time management, writing of assignments and note taking, students can visit the university ADC department where they will be helped.

Module outline

Study Unit 1: Staying afloat within the 4IR era

Study Unit 2: Technology Identification

Study Unit 3: Technology Selection

Study Unit 4: Technology Acquisition

Study Unit 5: Technology Exploitation

Study Unit 6: Technology Protection

Study Unit 7: TM Tools

Study Unit 8: A Journey of Digital

Innovation & Transformation

Registered module outcomes and objectives

Upon completion of the subject, students will be able to:

- To define how technology can be used to disrupt existing industries and gain competitive advantage
- To describe selected technology developments and how it could impact the world that they live in
- To assess the range, scope, and complexity of the phenomena, issues, and problems related to technology management;
- To discuss various problems where particular managerial decisions need to be taken such as technology acquisition and transfer;
- To use a range of tools used in technology creation, search, assessment, selection, implementation, utilization, and strategy;
- To describe the primary tasks and decisions that are required to turn a technological innovation into a sound business opportunity;
- To assess how to integrate technology and business knowledge in running business successful.

Study material and prescribed books

The following book is prescribed for this module and learners are expected to buy the book or read it online as it will be used during the course. A competent manager will, however, have a range of managerial books in his or her private library.

Supporting e-book (Available online in the university library & eFundi)

G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.

Assessment

Assessment will be done through class assignments, individual assignments, practical assignments and a written final online assessment/PoE. A student will fail the course if a mark of less than 45% is achieved in either the aggregate assignment mark, or in the written final online assessment /PoE. There are no second opportunities for written final online assessment /PoE.

Semester Mark Assessment: 50% of the module mark

- Individual Assignment: 50% of semester mark
- Group Assignments: 50% of the semester mark

Final Assessment/ PoE: 50%

Module mark: (SMA+ FWE) %

PoE/Group Project/Final assessment

Attached in appendices

Individual assignment

Attached in appendices

Group assignments

Attached in appendices

Icons

	Time allocation		Learning outcomes
	Study material		Assessment / Assignments
	Individual exercise		Group Activity
	Example		Reflection

Warning against plagiarism

ASSIGNMENTS ARE INDIVIDUAL TASKS AND NOT GROUP ACTIVITIES. (UNLESS EXPLICITLY INDICATED AS GROUP ACTIVITIES)

Copying of text from other learners or from other sources (for instance the study guide, prescribed material or directly from the internet) is **not allowed** – only brief quotations are allowed and then only if indicated as such.

You should **reformulate** existing text and use your **own words** to explain what you have read. It is not acceptable to retype existing text and just acknowledge the source in a footnote – you should be able to relate the idea or concept, without repeating the original author to the letter.

The aim of the assignments is not the reproduction of existing material, but to ascertain whether you have the ability to integrate existing texts, add your own interpretation and/or critique of the texts and offer a creative solution to existing problems.

Be warned: students who submit copied text will obtain a mark of zero for the assignment and disciplinary steps may be taken by the Faculty and/or University. It is also unacceptable to do somebody else's work, to lend your work to them or to make your work available to them to copy – be careful and do not make your work available to anyone!

For the NWU link for plagiarism, go to http://www.nwu.ac.za/webfm_send/25355



Study unit 1

STAYING AFLOAT WITHIN THE 4IR ERA

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations.

The general pattern includes:

- Deal with a specific section of the prescribed textbook
- Discuss a specific case study relevant to the context of the course
- Discuss a specific technology important for the now and the future e.g. biotechnology, Artificial Intelligence etc.

Study outcomes



- Create an understanding of the fourth industrial revolution and its impact in the society and economy
- Initiate an understanding of different disruptive technologies in the 4IR era
- Understand that for organizations to survive the 4IR weave, there need to start reskilling their workforce and embracing technologies in their processes.

Assessment and Learning Objectives



After completing this study unit, a learner will have been exposed to:

- The good and the bad implications of the 4IR
- Why it is important to redevelop our skills suit the 4IR

Study material



- <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/> (Last accessed on 20/5/2020).
- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.

Recommended Reading and Videos

- <https://www.cnbc.com/2019/01/16/fourth-industrial-revolution-explained-davos-2019.html>
- <https://www.youtube.com/watch?v=XwIQLLbD7SI>

Study unit 2

TECHNOLOGY IDENTIFICATION

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations.

Study outcomes



- Discuss the process of technology identification
- Continue the understanding of the demise of KODAK as an organization
- Gain an understanding of the application of the digitization in your organization

Assessment and Learning Objectives



After completing this study unit, a learner should have a good understanding of:

- Why it is critical for organizations to digitize. Refer to prescribed book – Part I Cross-industry Trends.
- Technology identification processes mainly focus on determining the type of technology and nature of the services together, giving organizations the priority at the strategic and operational levels
- The demise of Kodak because of the lack of digitization.

Study material



- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.
- The provided KODAK case study

Recommended Reading

- Any material pertaining to digitization and technological identification

Case Study - Group Discussions (Available on Efundi)

- The Demise of Kodak

Study unit 3

OPTIMIZING TECHNOLOGY SELECTION

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations.

Study outcomes



- Define requirements that focus on the specific needs of the center and IT for this project
- Determine appropriate vendors to consider based on high-level requirements
- Document the requirements in appropriate vendor communication
- Evaluate options through targeted due diligence, using the criteria that matter to you, ensuring an apples-to-apples comparison
- Bring the team to consensus on the “best” vendor and solution

Assessment and Learning Objectives



After completing this study unit, a learner should have a good understanding of:

- Optimizing technology selection and its processes.
- Tradeoffs in determining the best solution.
- Digital Innovation and Transformation Framework

Study material



- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.

Recommended Reading

- Lecture slides and notes

Case Study - Group Discussions (Available on Efundi)

- Discuss Blockchain/ the Amazon Company

Study unit 4

TECHNOLOGY ACQUISITION

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations

Study outcomes



- Identify attractive technologies or partners with technological capabilities;
- Assess opportunities, and select of the most promising ones and consideration of the terms of the acquisition; Negotiation of the terms of acquisition between acquirers and sellers;
- Transfer of the technology to the acquirer, if these negotiations have been successful.
- Discuss the complexities associated with technology acquisition process

Assessment and Learning Objectives



After completing this study unit, a learner should have a good understanding of:

- Acquisition evaluations and options
- Contracts and relationships
- Ownership of intellectual property and joint IP ownership

Study material



- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2

Case Study - Group Discussions

- Discuss the cloud computing technology

Study unit 5

TECHNOLOGY EXPLOITATION

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations.

Study outcomes



- Find the right business models for commercialization, transferring technology in an effective and efficient manner
- Create an understanding of technology in a specific area – in this case the Big data.

Assessment



After completing this study unit, a learner should have a good understanding of:

- Commercialization/marketing
- Technology transfer
- Technology utilization
- Reverse innovation

Study material



- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2

Recommended Reading

- Any developments in the field of technology transfer and utilization activities.

Case Study - Group Discussions (Available on prescribed eBook)

- Discuss IoT & The case of BICC Cables Ltd, the UK's largest cable manufacturing company.

Study unit 6

TECHNOLOGY PROTECTION

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations.

Study outcomes



- Create a new paradigm for the next generation cyber-security systems
- Discuss the challenges associated with Intellectual Property (IP)
- Understand knowledge protection mechanisms

Assessment and Learning Objectives



After completing this study unit, a learner should have a good understanding of:

- Intellectual Property
- Patents and registration of design patterns
- Copyrights, Secrecy, Design complexity and Trademarks
- Confidentiality agreements and knowledge management

Study material



- Refer on prescribed book section of Cyber security
- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.

Recommended Reading

- Recent developments in technology protection.

Case Study - Group Discussions (Available on prescribed eBook)

- Discuss AI & Cyber security case study...refer to prescribed book

Study unit 7

TECHNOLOGY MANAGEMENT TOOLS

All contact sessions follow the same general pattern i.e. presented online via ZOOM, case study discussions or group presentations.

Study outcomes



- Introduction to tools i.e. Patent analysis and Portfolio Management, S-Curve, and Value Analysis
- Understand the new era of innovation.

Assessment and Learning Objectives



After completing this study unit, a learner should have a good understanding of:

- The new era of innovation
- Tools used for external information analysis, such as technology forecasting and benchmarking;
- Tools used for internal information analysis, such as skills and innovation audits;
- Tools to calculate workload and resources needed in projects, such as project management and portfolio management;
- Tools to manage working together, such as interface management and networking;
- Idea creation and problem solving techniques, such as creativity and value analysis;
- Tools related to improving efficiency and flexibility, such as lean thinking and continuous improvement

Study material



- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.

Recommended Reading

- Any related articles on the future of work.

Case Study - Group Discussions

- Discuss Augmented Reality & Case study in the book



Study unit 8

A JOURNEY OF DIGITAL INNOVATION AND TRANSFORMATION

All contact sessions follow the same general pattern except for the last session where the final case study will be concluded and the rest of the session will deal with final assessment preparation.

Study outcomes



- Continue the understanding of leveraging digital technologies to innovate and transform your work place.

Assessment and Learning Objectives



After completing this study unit, a learner should have a good understanding of:

- Discuss the key activities, challenges, and success factors of each phase of Hilti's digital journey and discuss the lessons learned and their implications for digital enterprises.
- Preparation for the final assessment.

Study material



- G. Oswald & M. Kleinemeier, 2017: Shaping the Digital Enterprise Trends and Use Cases in Digital Innovation and Transformation, Germany; Springer. ISBN 978-3-319-40967-2.

Case Study - Group Discussions (Available on prescribed eBook)

- Discuss "A Journey of Digital Innovation and Transformation—The Case of Hilti,". Refer to the prescribed book.

Individual Assignment

Due Date: 14 Sept 2020

QUESTION ONE (50 MARKS)

- 1.1 **A technology entrepreneur:** Please search and select one tech. entrepreneur online (or Any media) that made headlines in year 2018 & 2019 in South Africa, who you find impressive and prepare a written summary to explain: the idea, the industry applicable, the inventor, the business model, why impressive and how can it contribute to economic-social-environmental value. You will submit a (maximum) 2- 3-page analysis. (25 marks)
- 1.2 Discuss any three main barriers for innovation, and give practical examples? (15 marks)
- 1.3 The Fourth Industrial Revolution is rewriting the business rulebook. This process has been painful for some, and a boon to others. Discuss how the Fourth Industrial Revolution will affect business and what could organisations do to survive this storm? (10 marks)

QUESTION TWO (50 MARKS)

- 2.1 Discuss how the blockchain model and mobile technologies are triggering a new era of mobile financial services in developing countries, potentially eliminating the need for brick-and-mortar banks. (20 marks)
- 2.2 How would you change your organisation into an exponential organisation? Start off with a brief description of your organisation. Keep in mind that not all the proposed steps are necessary and also it depends if you are a start-up or large organisation already in existence. (15 marks)
- 2.3 Discuss the major reasons that led to the demise of KODAK as discussed in unit 1. As a technology consultant, what would you have done to address the situation that was happening at KODAK had they consulted you earlier before their demise? (15 marks)

Group Assignments

NB: For each assignment, each group should submit a 2-3 page written discussion/analysis on the due date and be ready to discuss their work during class time through an oral presentation (Powerpoint).

1. Study Unit 3: Submission and Presentation Due Date: (15th August)

Discuss the concept of Blockchain, explaining how it works, its advantages and drawbacks. Explain how it has affected the Mobile Financial Services? (20 marks)

2. Study Unit 4: Submission and Presentation Due Date: (29th August)

Cloud computing is one of the new technologies in this 4IR era that is becoming popular. Explain what it entails and how it has impacted businesses. Give practical examples. (20 marks)

3. Study Unit 5: Submission and Presentation Due Date: (5th September)

Internet of Things (IoT) applications are expected to equip billions of everyday objects with connectivity and intelligence. It is already being deployed extensively, in various domains, namely: Wearables, Smart Home Applications, Health Care, Smart Cities etc.

Explain what IoT is and how IoT is applied in the above areas. (20 marks)

4. Study Unit 6: Submission and Presentation Due Date: (12th September)

Discuss the concept of Artificial Intelligence including its impact on businesses and other domains. (20 marks)

5. Study Unit 7: Submission and Presentation Due Date: (3rd October)

Discuss how Augmented Reality is impacting industries. For a practical example you can describe the following: Company, Situation faced, Actions taken, Results and Lessons learnt. (20 marks)

Semester Group Project

- 1. Final Submission and Presentations Due Date: 29/10/2020**
- 2. DRAFT OF GROUP REPORT Due: 17/10/2020**
- 3. Each team will consist of 3-4 students (Strictly not more than that)**

The project aims to develop a team effort among participants. Team members will work together throughout the term to accomplish the team assignment. The purpose of this project assignment is to develop the students' ability to identify and evaluate technological innovation opportunities for a new start-up firm. Students gain insights on how technological innovations can be managed in a real life example by considering theoretical tools taught at course.

Students will select the topic of their project that will enable students to study in more detail technologies, businesses, and other aspects of businesses in which they are most interested. Each team will consist of 3-4 students.

The project assignment is divided into three distinctive parts, each of which correlates to specific parts of the purpose, as well as to specific parts of the course content. Be advised to use the lectures, journals, internet for research and course material for provision of useful concepts, thought models and tools. The final report should be kept at minimum, ranging between 20-25 pages long. There will be an interim report to be handed in to the instructor to indicate the progress of the project report.

A word of caution here; perhaps a point that does not need to be made but still may be useful to reiterate yet again. When producing written reports or verbal presentations it is extremely important to credit other people's work and ideas by proper citations. This is as much true for books as it is for web sites, or whatever other media you can think of. None of this is public knowledge and if not cited properly it constitutes **PLAGIARISM**.

The final project report will be structured in three parts as described below:

Part I: Thinking a technological innovation

The first step is to find a potential technological innovation idea for a company that students are familiar with. By brainstorming and literature review, students need to suggest an innovative idea and then to explain the rationality behind the decision.

1. Suggest a new firm in a defined industry

2. Make a short description of the firm to be established: its products, customers, etc.
3. Provide a draft business plan for technological innovation:
 - Customers – Competitors - Products (or services) - Main competencies needed
 - Factors influencing the competitive advantage in the new technology.

Part II: How to implement and manage a technological innovation

When the business idea has been defined, the second step is to analyze different ways of realizing it.

1. What resources are needed? (Ex: human resources, technology, skills, etc.)
2. How to supply resources needed? (Ex: joint ventures, banks, etc.)
3. Determine the timing of the innovation and how to launch it. (Ex: advertising, marketing, etc.)
4. Discuss how to manage change. (Ex: teamwork, motivation, leadership, values, culture, etc.)
5. Suggest new organizational structure (Ex: matrix organization, etc.)

Part III: How to institutionalize a technological innovation for future

In order to develop and grow new innovation ideas, firms need to have some kind of supporting structures and processes. In order to create an innovative spirit within the company, students should come up with some suggestions.

1. List your suggestions for organizational restructuring to keep the firm innovative.

SUGGESTION: Also make use of Technology and Innovation journals for good ideas.

NB: DRAFT Report should consist of:

- 5 pages long-text to explain:
- What are the general and technology strategies of the company and what should they be based on your technological innovation?
- What are the technology plans of the firm? How should the R&D activities organized?
- What might be the roadmaps for the company?

Academic Honesty:

Learning is enhanced through cooperation and as such you are encouraged to work in groups, ask for and give help freely in all appropriate settings. At the same time, as a matter of personal integrity, you should

only represent your own work as yours. Any work that is submitted to be evaluated in this class should be an original piece of writing, presenting your ideas in your own words. Everything you borrow from books, articles, or web sites (including those in the syllabus) should be properly cited. Although you are encouraged to discuss your ideas with others (including your friends in the class), it is important that you do not share your writing (slides, MS Excel files, reports, etc.) with anyone. Using ideas, text and other intellectual property developed by someone else while claiming it is your original work is *plagiarism*. Copying from others or providing answers or information, written or oral, to others is *cheating*. Unauthorized help from another person or having someone else write one's paper or assignment is *collusion*. Cheating, plagiarism and collusion are serious offenses that could result in a fail and disciplinary action. Please pay utmost attention to avoid such accusations.