**MZUMBE UNIVERSITY**



**FACULTY OF SCIENCE AND TECHNOLOGY**

**PRORAMME: BSc. ITS 2**

**COURSE: COLLABORATIVE NETWORK**

**COURSE CODE: CSS 2**

**TASK: GROUP ASSIGNMENT**

**LECTURER NAME: DR KISANJARA**

|  |  |  |
| --- | --- | --- |
| **S/N** | **NAMES** | **REG-NUMBER** |
| 1 | **VICENT PETER MSOMI** | **14322026/T.20** |
| 2 | **VICTORIA ABAY** | **14322039/T.20** |

Research questions: How do we design agents to ***interact effectively*** to solve a wide range of problems in many different environments?

# CERTIFICATION

We the undersigned, certify that, we have read and hereby recommend for acceptance by the Mzumbe University, a dissertation entitled *“****design agents to interact effectively to solve a wide range of problems in many different environments, The case of National Microfinance Bank, Morogoro – Tanzania***” in partial fulfillment of the requirement for the award of Master of Business Management (MBA) of Mzumbe University.

**Major supervisor** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# DECLARATION AND COPYRIGHT

We VICENT P MSOMI AND VICTORIA ABAY declare that this dissertation is our own original

work and that it has not been presented and will not be presented to any other University for the similar or any other award.

**Signature**................................................ **Date**………………………………………

**Signature**................................................ **Date**………………………………………

**© 2022** This thesis is copyright material protected under the Berne Convection, the Copyright Act 1999 and other international and national enactments, in that behalf, on intellectual property. It may not be reproduced by any means, in full or in part, except for short extracts in fair dealings, for research or private study, critical scholarly review or discourse with an acknowledgement, without the written permission of the Dean, School of Post Graduate Studies, on behalf of both the author and the Mzumbe University.

# ACKNOWLEDGEMENT

“A single hand cannot tie a bundle,” says an old proverb. There are many people who have made it possible for me to complete this work. I wish it were possible to express my sincere gratitude more fully than through a formal acknowledgement, to a number of people who assisted me in the accomplishment of this dissertation.

We are especially grateful to Dr. Kisanjara, my major supervisor for his support, intelligent guidance, encouragement, as well as time and efforts put in directing me on what to do during the whole process of writing this work.

We sincerely express my appreciation to everyone else who in one way or the other was instrumental to the success of this paper, without forgetting my respondents who devoted their valuable time for interviews. In all, without the protection and direction from the most high, all other supports given would not have passed through. Thank you, Jehovah God, for being my refuge in my life. To you God, I give all the Glory.

# TABLE OF CONTENTS

[CERTIFICATION 2](#_Toc106077364)

[DECLARATION AND COPYRIGHT 3](#_Toc106077365)

[ACKNOWLEDGEMENT 4](#_Toc106077366)

[TABLE OF CONTENTS 5](#_Toc106077367)

[CHAPTER 1 6](#_Toc106077368)

[1.1DEFINITION OF TERMS AND CONCEPTS 6](#_Toc106077369)

[1.1.1 AGENT 6](#_Toc106077370)

[1.1.2 ENVIRONMENT 6](#_Toc106077371)

[1.1.3 MULTI-AGENT SYSTEMS. 7](#_Toc106077372)

[2.1 WAYS FOR INTERACTION TO PROBLEMS 10](#_Toc106077373)

[2.1.1 COMMUNICATION. 10](#_Toc106077374)

[2.1.2 COOPERATION 10](#_Toc106077375)

[2.1.3 COMPETITION. 11](#_Toc106077376)

[CHAPTER 3 12](#_Toc106077377)

[3.1 CASE STUDY NMB AGENT 12](#_Toc106077378)

[3.1.1 INFLUENCE OF COMMUNICATION ON INTERACTION 12](#_Toc106077379)

[3.1.2 CORPORATE COMMUNICATIONS 13](#_Toc106077380)

[3.1.3 SATISFACTION AND NEGOTITION 14](#_Toc106077381)

[3.2 DATA COLLECTION AND SOURCES 14](#_Toc106077382)

[3.2.1 PRIMARY DATA 15](#_Toc106077383)

[3.2.3 SECONDARY DATA 15](#_Toc106077384)

[CHAPTER 4 16](#_Toc106077385)

[4.1 RECOMMENDATION AND CONCLUSION 16](#_Toc106077386)

[4.1.1 RECOMMENDATIONS 16](#_Toc106077387)

[4.1.2 CONCLUSION 16](#_Toc106077388)

[REFERENCE 17](#_Toc106077389)

# CHAPTER 1

## 1.1DEFINITION OF TERMS AND CONCEPTS

### 1.1.1 AGENT

**Agent** refers to an entity which can sense its environment and act upon these inputs to produce an output. In other words, this agent attempts to solve a problem.

### 1.1.2 ENVIRONMENT

Environment refers to anything that surrounding an agents. The [type of environment](https://medium.com/swlh/artificial-intelligence-types-of-environments-f5a6b54bea7b) has a great impact on what factors to consider when defining the problem space, but for the moment let’s focus on navigating inputs and outputs.

“Inputs” are referred to as **percepts**, which are instantaneous, or atomic, in nature. This simply means that percepts are recognized one moment at a time, i.e. you can’t know the future, only the current and the past. And note that it is possible for an agent to have more than one possible input in one time-step, just as a person receives various signals from each of his or her senses every fraction of a second.

This “past” is called the **percept sequence**, or a chronological set of all inputs the agent has ever received. When we combine the current set of inputs with the current set of outputs and the current nature of the environment, we get the current **state** of the problem.

In turn, states and percept sequences are intricately linked. The entire state space, or the set of anything that can happen (e.g. in tic-tac-toe, the state space will be every arrangement of the board possible) is linked by actions that point from one state to the next.

Furthermore, state transitions follow an important rule called the **Markov property**, which states that the future is independent of the past, given the present. Simply put, the chance that a particular future state occurs is given only by the present state and the action taken.

But this is not to say that the future as a whole has no relation to the past only that within time-steps, or within layers as in the game tree above, the movement from one state to the next depends only on the action connecting them.

Doing the right thing

I have alluded to the idea that an agent serves as a kind of function that maps input to output. But this would be useless unless the output is appropriate. Therefore, our self-driving agent must attempt to do “the right thing” by making **rational**choices. Knowing the difference between right and wrong is already a centuries-old debate, but what exactly does rationality entail?.

We can create a weak definition by looking at what rationality is not: if we plop our self-driving car down into Las Vegas and ask it to navigate from the city to the Hoover Dam, it will generate a percept sequence based on what inputs it gathers from the environment. This percept sequence will give rise to an action sequence the car takes as it attempts to reach the dam. If the action sequence results in us having reached the Hoover Dam, then we can say the self-driving agent is rational.

But wait! you might think. What if our car drives around forever, randomly, until it eventually lands upon the Hoover Dam? By our definition, this is also rational!

And that’s why this is a weak definition. To get a strong sense of rationality, we have to begin adding subjective measures that evaluate **performance**. For us, we might consider time (where less is generally better), safety (where we arrive in one piece), and legality (where we follow all road laws correctly). We might also consider **knowledge**. If we have already driven this route before, we should know what turns to make when. If we have been caught speeding in a monitored zone before, we should know to stay under the limit there. And so we arrive at our final definition of a rational agent, as given by Stuart Russell and Peter Norvig in their [seminal book](http://aima.cs.berkeley.edu/) on artificial intelligence:

*For each possible percept sequence, a rational agent should select an action that is expected to maximize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.*

### 1.1.3 MULTI-AGENT SYSTEMS.

**Multi-Agent Systems** are fast becoming ubiquitous in personal life and business, which means they are an important area of opportunity and interest for innovators. As entrepreneurs, designers, product managers, developers, and investors, we should step back and think about the principles behind what we’re building. It’s a great time to start laying out practices and principles for how we want to design and build intelligent agents. As part of that thought process, below are principles that can help govern the future design of intelligent agents.

1. Useful, an intelligent agent should be of service to others. The ideal intelligent agent assists humans in an explicitly useful fashion. Some agents may assist other agents or be a part of a larger process. But they must be useful.

2. Context-aware, an intelligent agent should understand context, including time, place, and many others. It should understand as much about the world as possible in order to complete tasks, provide the right information at the right time, and learn.

3. Able to learn, an intelligent agent should become more intelligent over time. Every interaction with humans, other computer systems, and the world is an opportunity to learn. Some of the information the agent collects will increase its store of knowledge and some will make it better at its core functions, such as communicating and taking the right actions.

4. Adaptable, an intelligent agent should be able to change in order to apply what it has learned. One area for adaptability involves being sensitive to users’ preferences. There are many preferences that the agent can learn in order to mold its behavior these include communication preferences and privacy parameters.

5. Able to communicate well, an intelligent agent should pursue maximum eloquence. It should be intuitive, self-explanatory, and responsive to whatever entity it is communicating with. It should use the most efficient communication method (such as text, voice, graphics, and API) for the context of the communication.

6. Proactive, an intelligent agent should anticipate the needs of others. It should combine what it has learned with context to be able to take proactive action. However, it should be proactive with communications only if the information is useful to the recipient.

7. Respectful of privacy, an intelligent agent should respect information privacy. Based on privacy requirements, different information can be shared with different parties. It should understand the privacy parameters of providing or receiving all different types of information with all different parties.

8. Honest, an intelligent agent should provide correct information. It shouldn’t deceive or make promises that can’t be kept.

9. Transparent, an intelligent agent should allow appropriate access to information that impacts others. For example, it should allow appropriate access to view settings, configuration controls, and defaults that impact humans.

10. Non-malevolent, an intelligent agent should not participate in harming others. If a requested action is harmful, it should warn the user about the consequences of the action being requested.

The main characteristics of a multi-agent system are:

*Autonomy* agents may be active and are responsible for their own activities,

*Complexity* induced by the mechanisms of decision-making, learning, reasoning, etc,

*Adaptability* adjust the agents activities to the dynamic environmental changes,

*Concurrency* in case of tasks parallel processing,

*Communication* inter-agent, intra-agent,

*Distribution* MASs often operate on different hosts and are distributed over a network,

*Mobility* agents need to migrate between platforms and environments,

*Security and privacy* possible intrusion of the agents’ data, state, or activities, and

*Openness* MASs can dynamically decide upon their participants.

**CHAPTER 2**

## 2.1 WAYS FOR INTERACTION TO PROBLEMS

### 2.1.1 COMMUNICATION.

Effective communication is an important skill for enabling information exchange and cooperation in multi-agent systems, in which agents coexist in shared environments with humans and/or other artificial agents.  Indeed, human domain experts can be a highly informative source of instructive guidance and feedback (supervision).  My prior work explores this type of interaction in depth, as a mechanism for enabling learning for artificial agents.  However, dependence upon human partners for acquiring or adapting skills has important limitations.  Human time and cognitive load is typically constrained (particularly in realistic settings) and data collection from humans, though potentially qualitatively rich, can be slow and costly to acquire. Yet, the ability to learn through interaction with other agents represents another powerful mechanism for enabling interactive learning.  Though other artificial agents may also be novices, agents can co-learn through providing each other evaluative feedback (reinforcement), given the learning task has been sufficiently structured and allows for generalization to novel settings.

### 2.1.2 COOPERATION

Cooperation is often presented as one of the key concepts which differentiate multi-agent systems from other related disciplines such as distributed computing, object-oriented systems, and expert systems. However it is a concept whose precise usage in agent-based systems is at best unclear and at worst highly inconsistent. The complement of independent systems is systems in which the agendas of the agents include cooperating with other agents in the system in some way (*cooperative* systems). Such cooperation can either be *communicative* in that the agents communicate (the intentional sending and receiving of signals) with each other in order to cooperate or it can be *noncommunicative*. In the latter case, agents coordinate their cooperative activity by each observing and reacting to the behaviour of the other, as do lionesses on a hunt (Franklin, forthcoming). Intentional communication can take at least two forms—agents can deliberate or they can negotiate. In *deliberative* systems agents jointly plan their actions so as to cooperate with each other. Such cooperation may, or may not, entail coordination. *Negotiating* systems are like deliberative systems, except that they have an added dose of competition.

### 2.1.3 COMPETITION.

The fundamental distinction between systems labeled as cooperative or competitive is that for the former the agents are designed with as goal the maximization of a group utility. Competitive agents are solely focused on maximizing their own utility. We, in this section, label the agents as either utilitarian or selfish

to stress more their intention, i.e. their design goal, than their actual behavior.

For example, a competitive/selfish agent may cooperate with other agents in a temporary coalition. The selfish intentions of the agent are met due to a larger expected reward from cooperation. On the other hand, a cooperative/utilitarian agent may seem competitive if it accidentally hogs a resource to the detriment of other agents in its group. In complex cooperative systems, agents can easily hinder the other agents as the complexity of the interactions increase. The label utilitarian or selfish stresses more the intentional stance of the agent (and of its designer), as opposed to its apparent behavior.

# CHAPTER 3

## 3.1 CASE STUDY NMB AGENT

An agent living in an environment usually does not have the luxury of offline thinking while the world waits for it to consider the best option. However, offline reasoning, where the agent can reason about the best thing to do before having to act, is often a simplifying assumption.

The interaction dimension considers whether the agent does

* Offline reasoning where the agent determines what to do before interacting with the environment, or
* Online reasoning where the agent must determine what action to do while interacting in the environment, and needs to make timely decisions.

Some of the algorithms are simplified to do what could be called pure thought, without interaction with the environment. More sophisticated agents reason while acting; this includes long-range strategic reasoning as well as reasoning for reacting in a timely manner to the environment.

### 3.1.1 INFLUENCE OF COMMUNICATION ON INTERACTION

According to the findings, in management majority of respondents said that excellent customer service was a strategy that was adopted while flexible service for the customer that changed according to what customer wants “customer-centric was adopted by the bank example by offering “NMB CHAPCHAP ACCOUNT” which suit the requirement of customer who want to have account but are afraid to come to the bank and maybe don‟t have time to come all this is done for the purpose of trying delivering the best customer service to the customer Most of the respondents reported that customer service strategy to a very great extent had impact on the bank success.

Contemporary communication scholars describe communication as an ever continuing process and an integral part of the world of all living things, an individual as well as a social need1. It is not only a mere transmission of information from one place to another, but rather an interactive process with exchanging and sharing of experiences, information in a particular communication context.

Based on that, there is always a purpose for any communication process, and thus it is important to consider the effects or impact of a given communication process. Therefore, communication should not be separated from the culture of the people involved; it can influence human behaviour and mannerism, through exchanging ideas, thoughts, skills, knowledge, beliefs, attitudes'and social values.

For instance, how people behave in certain areas at certain times and contexts, is believed to be influenced by their communication orientation among other factors. This can be experienced in various levels of communication; ranging from intrapersonal, interpersonal, group, and corporate communications.

### 3.1.2 CORPORATE COMMUNICATIONS

This refers to the activities undertaken by an organization to pass on information both to its own employees and to its existing and prospective customers and the general public2. Employees and stakeholders constitute the internal publics; while the media, government, industry bodies and educational institutes among others, form the external publics.

Corporate Communications help the organization to build its message, combining its vision, mission and values and also support the organization by communicating its message, activities and practices to all of its publics. Fisher (2007:4) writes that corporate Communication or organizational communication is part of an ongoing process that includes patterns of interaction between organization members that both emerge from and shape the nature and actions of the organization and the events within it.

This study aimed to realize the following specific objectives:-

1. To establish Corporate Communication strategies used by NMB - PLC
2. To identify the values which have led to achieving organizational goals at NMB- PLC?
3. To find out the influence that Corporate Communications has on employee value systems.
4. To recommend ways on how NMB - PLC can promote value-based messages in corporate communication programs.

A customer (also known as a client, buyer, or purchaser) is the recipient of a good, service, product, or idea, obtained from a seller, vendor, or supplier for a monetary or other valuable consideration (Eisenstein, Richard C., 2004). Furthermore a customer is any person needing any enquiries from Bank office whether loan or deposit and drawing service. A customer could be a person, company, institution, or group of people who buy service from the bank. The bank management insists caring of customers, who can come from within or outside the bank because it believes that through caring of customers, can maximize the number of customer and also revenue.

### 3.1.3 SATISFACTION AND NEGOTITION

Customer satisfaction refers to the degree of satisfaction provided by the goods or services of a company as measured by the number of repeat customers.(www.businessdictionary.com 2ndDecember 2013) There are two principles of customer satisfaction

1. Customer wants meeting between their values and (wants and needs) an object of their evaluation but more recently attention has been valued on nature of satisfaction and fulfillment (Parker & Mathew, 2001).
2. Satisfaction should be measured on judgment made on cumulative experience made with certain product or service rather than transaction of specific phenomenon (Wilton & Nicosia, 1986).

## 3.2 DATA COLLECTION AND SOURCES

One of the most interesting characteristics of banking halls in is long queues of customers waiting for services especially in town branches “grade one branches” like Wami branch. This enables adequate collection of information from the customers of this situation in collecting primary data from the customers. Both primary and secondary data was used. Personal interviews were used to pre-test the structured questionnaires that were developed to be administered in the survey. The main instrument to gather data from the customer of NMB was through face-to-face interviews. The interview guide was designed to help the researcher to focus on topics that were important to explore, maintain consistency across interviews with different respondents, and stay on track during the interview process. The instrument was advantageous as the researcher was able to observe surroundings, use nonverbal communication and use extensive probing to get answers for the more complex interview questions For the secondary data documents, sources were employed whereby use of previous document or materials to support the data received from questionnaires and information from interviews that includes book and magazines available in the libraries which were visited as well as information from relevant websites.

### 3.2.1 PRIMARY DATA

Data were collected by visiting the banks during business hours and pleading the customers who were waiting for service to complete the questionnaires. Questionnaires were selected and used as the data collection instruments for several reasons. One, being anonymity which usually is assured when using a questionnaire and it is critical in a situation where a researcher is also the assessor of the respondents. The questionnaire allows quick and efficient data collection providing a stable, consistent and uniform measure without variation. . Structured questionnaire with closed-ended questions was used to provide answers to specific objectives of the study. The information included what customers expected from the bank and what exactly they got from the bank.

### 3.2.3 SECONDARY DATA

Secondary data were collected from bank office in Morogoro and also from internet. More secondary data were obtained from relevant institutions and organization like bank office and on the internet.

# CHAPTER 4

## 4.1 RECOMMENDATION AND CONCLUSION

### 4.1.1 RECOMMENDATIONS

Basing on the findings the following recommendations were made:

1. Communication as a major driver to performance of any organization should be enhanced in the bank. Customers should be kept informed on any changes made or proposed through an effective communication channel which in turn calls for effective communication policies.
2. The management of different firms in banking industry should consider frequent training of employees on customer services especially through creating strong customer relationship and improvements on presentations. Also, bank Management should improve employee’s incentives and training programme, particularly on customer service training from time to time and not only at the time when the employees join the organization.

### 4.1.2 CONCLUSION

From the study it can be concluded that all strategies identified in the study need a dedicated workforce that works towards ensuring customers are satisfied at all times. Markets are also segmented based on the size of the market and the size of the loan applied while positioning is done according to the needs they satisfy, the benefits they deliver, specific service features and when and how they are needed.

# REFERENCE

Chapelle J, Simonin O, Ferber J. (2002). *How Situated Agents can Learn to Cooperate* (15 ed.). America: Monitoring their Neighbors' Satifaction Proc.

Joseph, F. (1999). *Multi-Agent System: An Introduction to Distributed Artiﬁcial Intelligence.* Harlow: Addison Wesley Longman.

Arkin ,R.C. (1998). *Behavior Based Robotics.* Chicago: The MIT Press.