

# UX OF A WEB BASED PLATFORM FOR MARKET LINKAGE BETWEEN FARMERS AND BUYERS IN TANZANIA

Cesilia Mambile, Dina Machuve, Sabine Moebis

Information and Communication Science and Engineering, The Nelson Mandela African  
Institution of Science and Technology (NM-AIST), Tanzania.

*Abstract: Poultry farming has a very good business potential (Mohammad Khairu Islam, Mohammed Forhad Uddin, 2014) since they are fast growing animals meaning the business has potential to generate high return on investment under a short period of time. For example past days it took about four months for a chicken to become two kilograms, however these days a two kilogram chicken can be produced within 42 days (Hamra, 2010). Despite the fact that poultry farming has good business potential there are some obstacles which hinder the poultry business success such as lack of market linkage. Even with advancement of technology which has brought affordable smartphones to most of the livestock farmers, potential livestock information systems in Tanzania are used by very few livestock farmers and some are not used at all (Mussa et al., 2016). It is not that users do not need the system, nor the system does not show any potential for them, but depend on its usability and how well it suited to the user requirements based on their differences. Users of the system have a lot of differences including exposure to technology (Kalimullah & Sushmitha, 2017). It is now as more important than ever that web applications provide a good user experience which was once considered luxury or an added expenses (Juan, 2014; Ross, 2014). Web based platform for reliable market linkage has been developed with more focus on usability and user experience design. Eye tracking method combined with retrospective think aloud method and facial expression was used to test user experience of the developed web application. The result shows that users were emotionally happy when performing the second and the third tasks. But when performing the first task and the last task users were emotionally anxiety and disappointed.*

*Keywords: UX; UX design; Web based platform; farmers and buyers; Market linkage; Market information.*

## 1. Introduction

This paper has been created to address the importance of consideration of UX design for farmers and buyers in Tanzania. In the context of this study UX is an emotional satisfaction and intuition a person feel when using a particular website. Web Based platform is a central location of various web pages that are all related and can be accessed by visiting the home page using a browser. In perspective of this study it refers to all marketing information including advertisement and other relevant details collecting and broadcasting that make use of web technology as a tool for accumulating and distributing that information. A farmer is a person engaged in raising living organisms, in this case raising any kind of livestock for business purposes. Buyer is a person who purchases goods, in this case who purchases livestock and livestock products for resale, hotel, industry, personal use, etc. Market linkage is a way of facilitating trade relationship between farmer and buyer. Market information is any information which will facilitate farmers to meet with buyers and sell their produce.

In Tanzania livestock buyers have easy access and more capabilities of using technology than farmers. This means that buyers are more exposed to technology than farmers(Mussa, Kipanyula, Angello, & Sanga, 2016; Temba, Kajuna, Pango, & Benard, 2016). The reason is simply the high cost of technology, a lack of awareness, a lack of knowledge, nature of their work etc. (Msoffe & Ngulube, 2016; Temba et al., 2016). The paper suggests that there should be UX design considerations when developing systems for livestock farmers in Tanzania. This will improve competitiveness in farming. An intention behind writing this paper is to motivate the development of systems in Tanzania with the real users in mind, which can help ensure that each system suits user needs (Buley, 2013), task related needs (usability) and non-task related needs (visual appearing).

The usage of web applications has become a part of everyday life, whether on private business or government applications (Chawla, Srivastava, & Bedi, 2017; Kalimullah & Sushmitha, 2017). We find nearly everything on the internet via websites and these web applications are used by people who are differently exposed to technology to accomplish different activities ranges from business, health, to farming activities(Chawla et al., 2017; Kalimullah & Sushmitha, 2017). Web applications play a significant role in the success of business (Chawla et al., 2017; Panthi & Mohapatra, 2017). In Tanzania, there are several livestock web applications such as LINKS,

TALINIST, Green planet livestock etc., developed for livestock farmers to provide them with various information, such as market information, poultry feeds information, poultry health and livestock breeding etc. This could imply that these websites have significant impact on livestock farming aspects of our society(Chawla et al., 2017; Panthi & Mohapatra, 2017).

But there is a gap, existing websites lack UX and usability. Studies conducted by (Mussa et al., 2016) and (Chawla et al., 2017) Shows that mostly of web applications are still being built with Ad hoc methods which focus more on presentation aspects. This methods do not consider UX design and usability, and this result to web applications that do not meet user needs and not interesting either. Being both usable and interesting, a web application might be regarded as appealing and as a consequence the user will enjoy using it(Hellweger & Wang, 2015). Therefore, it is important to develop these web based application for farmers in Tanzania with high degree of usability, functionality and user experience. The success of any application depends on how well it is being used by user and how well it is suited to the users requirements based on their experience(Hui & See, 2015; Kalimullah & Sushmitha, 2017).

According to Buley (2013) and Ross (2014) user experience is the overall effect or feeling created by the interaction and perceptions that someone has when using a website, mobile device, service or software. Hassenzahl (2012) defined user experience as meaningful personally encountered events. In order to reach more unified standardised definition of UX, The International Organization of Standardization (ISO 9241-210, 2010) defines term user experience as a “person’s perceptions and response resulting from the use and/or anticipated use of product, system or service”. Based on the literature above we can say that user experience is an emotional satisfaction and intuition a person feel when using a particular website, software or device. User experience is balance between the ability of the product to provide the user with task related needs and the ability of the product to provide the user with needs that are not task related needs such as stimulation and emotional effect when interacting with a product, the diagram below from Roto 2006 shows this balance.

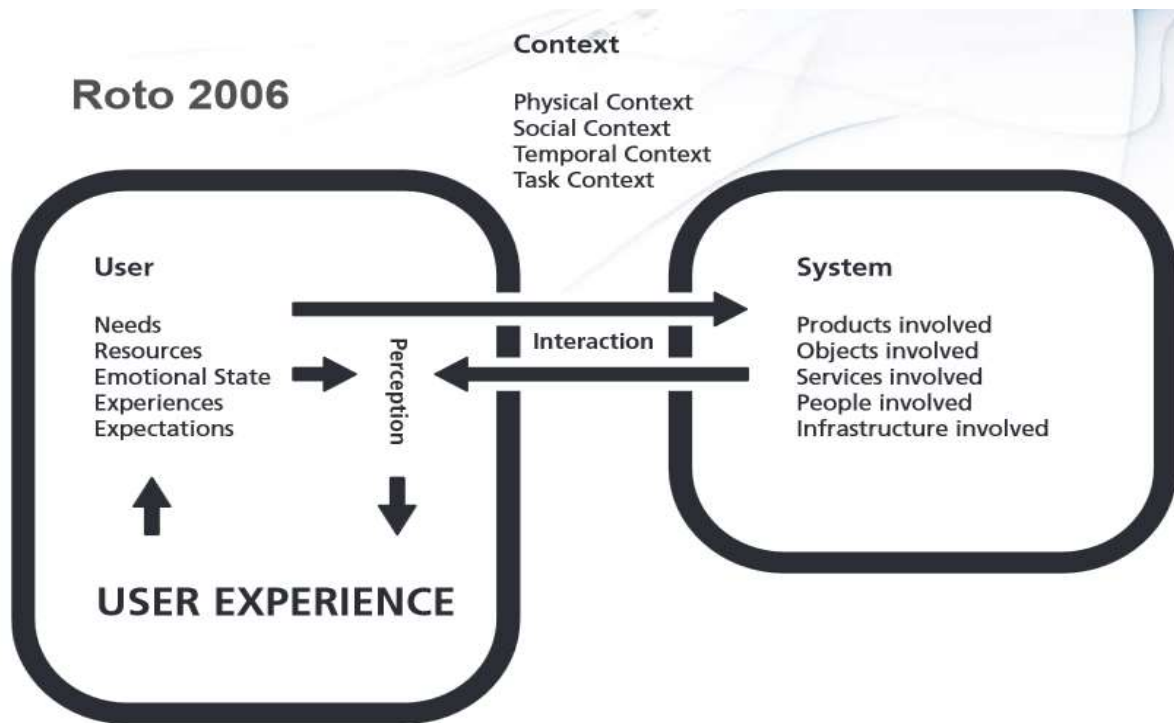


Figure 1: What UX is (Roto, 2016)

The first part of this paper discusses the importance of web applications in livestock farming including poultry farming; it also introduces the meaning of user experience. The second part of this paper introduces the problem and also discusses the need of user experience in Tanzania. The third part is to bring user experience design to web based platform for reliable market linkage between poultry farmers and potential buyers in Tanzania. Followed by the actual implementation, user experience testing experiment design, results and lastly conclusion and recommendation.

## 2. Problem

Despite the fact that advancement of technology has brought affordable smartphones to most of the livestock farmers, potential livestock information systems in Tanzania are used by very few livestock farmers and some are not used at all (Mussa et al., 2016). It is not that users do not need the system, nor the system does not show any potential for them, but depend on its usability and how well it suited to the user requirements based on their differences. Users of the system have a lot of differences including exposure to technology (Kalimullah & Sushmitha, 2017). For example, the results obtained during the study conducted by Mussa et al.,(2016) to evaluate the usability and users satisfaction of the Livestock Information Network Knowledge System (LINKS)

indicate that information targeting and access in LINKS was not well planned, since the access of information from LINKS is mainly through SMS, Community information center, email, Newspaper, Television and Radio. All these methods said to favour buyers than farmers because buyers have easy access and more capabilities of using technology, while the primary target of LINKS were farmers. So the development was not user centred, resulted in an ineffective system and a lack of user satisfaction, which means bad user experience. Considering UX design for farmers and buyers is very important, since technology is always accepted and used, based on how well a person has previously been exposed to that technology.

### 2.1. User Experience considerations in system development in Tanzania

It is now as more important than ever that web applications provide a good user experience which was once considered luxury or an added expenses (Juan, 2014; Ross, 2014). Even most successful firms in the world like Google, iPhone and Amazon now recognize that focusing on user experience is a key to achievement and novelty (Ross, 2014; Treder, 2013). Systems in Tanzania need user experience design, since it makes technology accessible and usable for everyone. Good UX design caters specifically to the needs of the two very distinct groups of this study, farmers and buyers. It allows creation of a web application that nurture people's independence, intelligence and dignity (Buley, 2013; Juan, 2014). In comparison to developed countries, Tanzania we should also think big that UX design can enhance the growth of the livestock industry. Due to the tremendous growth of technology and business all over the world, it is increasingly recognised that having an app or website with an intuitive and functional user experience is not only crucial to customer happiness and satisfaction, but also key to profitability (Nielsen, Berger, Shuli, & Kathry, 2007). UX design builds the value of the business, since it can lead to happier users, fewer complaints, more sales and higher profit also elevates customer's perception of the entire brand (Nielsen et al., 2007; Ross, 2014). UX design helps people to derive pleasure (enjoyment) from the time they spend using technology. Furthermore UX design could help in emergency situations, for example in clinical setting good UX could help to find important information quickly and avoid mistakes.

Users have great expectation when they visit a web application. They increasingly want an experience that is valuable, easy to use and emotionally satisfying. Neglecting UX can result to sloppy site that people will never come back to. Developing an interaction rich experience can

derive people back to the site. UX design is deeply human centric, great UX design happen when you talk to users and solve their problem.

### 3. User Experience design in Web based platform for reliable poultry market linkage

Poultry farming has a very good business potential (Mohammad Khairu Islam, Mohammed Forhad Uddin, 2014). Chicken are fast growing animals meaning the business has potential to generate high return on investment under a short period of time. For example past days it took about four months for a chicken to become two kilograms, however these days a two kilogram chicken can be produced within 42 days (Hamra, 2010). There is high demand of poultry and poultry products, e.g. meat and eggs are in higher demand especial in urban and peri-urban areas by individual persons, restaurants hotels, industries etc. Due to increased health awareness about the red meat has made chicken to be a great alternative. Highest number of chick production. Limited start-ups risk and less capital investment. Despite the fact that poultry farming has good business potential there are some obstacles which hinder the poultry business success such as lack of awareness and knowledge of poultry farmers regarding online marketing, also poultry farmers are less exposed to technology.

Once developing a web based platform to link the poultry farmers with the potential buyers, it is an opportunity since advertising through Television, Radio and Brochure is so expensive and it is of limited distance coverage. Also advertising through friends it's not a way that someone could rely onto it. People will look for something cheap but enables them to advertise in wide context. Continue expansion for online sales because larger percent of people hang around the internet these days since the internet has become available and affordable. In order for poultry farmers to succeed in their business it will reach a time when it will become impossible for them to close their eyes on the internet. As far as Tanzania national is concerned, it is hypothesized that poultry farming support the livelihoods of 3.7 million households in Tanzania (Msami, 2007; Goromela, 2009). Thus indicating high significant contribution of chicken to the national economy and social status (MoHSW 2007) and to the farmer's wellbeing as well.

Marketing systems provide a great role in providing poultry farmers and buyers with necessary information hence proper coordination of exchange of goods between producer and consumer. In Tanzania, The developed livestock marketing system UX is missing. In this study Web based

application for market linkage between poultry farmers and potential buyers was developed by considering UX design.

There are various approaches to designing great user experience, because user experience don't happen by chance, they are created through user experience design process. Developing new products with better UX requires the participation of various stakeholders including real users(Juan, 2014; Sundberg, 2015; Treder, 2013). User involvement is especial important in order to identify the user's needs, requirements, capabilities, understanding what emotions are important for them in interaction and anticipate their expectations (Buley, 2013; Juan, 2014). In fact user participation is considered as one of the key principles of user centered design and has several benefits such as achieving usability and accessibility.

There are so many processes or frameworks for user experience design life cycle and they can be a great place to start designing user experience (Buley, 2013; Sundberg, 2015). For example there is Toddy Zaki Warfel framework which gives a good sequential over view of the activities that are conducted in typical user centered design process with functional design phase, content analysis phase, interaction design and information architecture phase and engineering phase. There is also David Armano framework with uncover, define, ideate, build and design phases, this framework also is good because it help you think about the higher level goals of each phase. From these two examples and others from Stephen P. Anderson, James Kelway etc. you will find there are standard set of activities and deliverables that are common to all like user centered design and usability testing. Someone will just need to understand this and then choose which model will suit him in the work that he is doing.

In order to consider good user experience design for farmers (less exposed to technology) and buyers (more exposed to technology), the UX design model life cycle introduced by Hartson and Pyla (2012) was used. This model was selected simply because it is simple unlike others which are confusing and complex. The four stages of this model suits well when designing new website. According to this model there are four elemental UX activities or stages: Analyze, Design, Prototype and Evaluation. We bring the UX design in web based platform for reliable market linkage between farmers and buyers by focusing on users and take the following best practise of this model. The life cycle of this model is illustrated in figure 2.

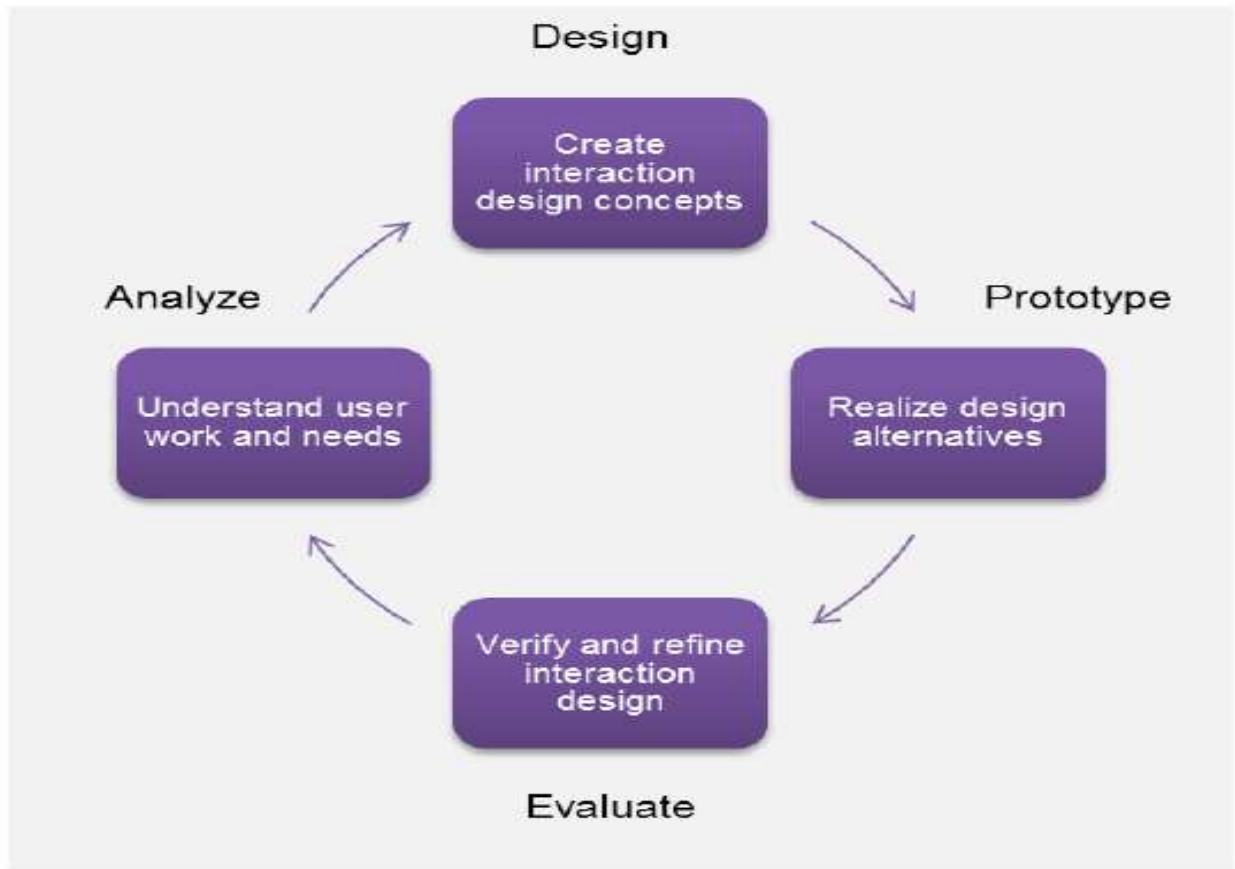


Figure 2: The life cycle of UX design (Hartson & Pyla, 2012)

The first phase (analysis phase) was understanding the users work and needs by listening to them, observing them in their natural habitat, create personas and emphasize with them (Hartson & Pyla, 2012; Sundberg, 2015). We used this phase to understand user’s needs, requirements, capabilities and expectation. In the design phase the use information obtained from the first phase was applied to develop the conceptual design and to determine interactional behaviour. In this phase wireframes, use cases, Data flow Diagrams were created. Design to serve the business goals by serving user goals was our key concern (Gualtieri, 2009; Juan, 2014; Ross, 2014). In the prototype (implementation) phase, the conceptual design was formulated into prototypes and implemented (Gualtieri, 2009; Hartson & Pyla, 2012).The implementation phase was explained in details in section 4. The last phase is evaluating the design with users by conducting usability testing to see to see if the design meets user needs and requirements and making changes based on the finding in an iterative design process(Gualtieri, 2009; Hartson & Pyla, 2012; Ross, 2014). This usability testing is explained in detail in section 5.

#### 4. The actual Implementation

There is always advantage of standing on the shoulders of the giants. Often implementations does not start from scratch. Most of the time we review other sites to see what they are doing, since there is always a research on what has worked or failed. Developing from scratch always is so closetful in terms of money and time, perhaps it will be very difficult to have all the functionalities together with good user experience. To reuse the software to build customized solution for users, makes it able to capture important benefit such as increased productivity and customer production. Also traditionally businesses in developing countries, similarly in developed countries are hindered by a small budget and limited technical expertise (De Assis Moreno & Cardoso Gomes, 2012). In order to save time and money cost while achieving good quality and user experience, Open source software was used in this study to implement the web based system for market linkage between farmers and buyers.

Open Source software (OSS) is a software system with the source code made free and open, so that anyone can read it, use it, change or improve the code (Bahamdain, 2015; Zennaro & Fonda, 2003). There are a variety of open source software packages out there that range widely in terms of quality and some open source software has been around longer than others and will likely rate higher in terms of quality and reliability (Heron, Hanson, & Ricketts, 2013; O'Neill, 2012). The challenge is to select the right software. Advantages of open source software includes, low cost, since it does not require a licence fee, they are flexible since you can modify it to better suit your business or project, and you can also add or remove a particular function, furthermore open source software has good quality and also are reliable (Bahamdain, 2015; Wiggins & Aubrey, 2012). Example Linux operating system proved to be effective in problems than MS word operating system could not solve or solved poorly and Apache a Web server which manages and provides access to internet web pages. (De Assis Moreno & Cardoso Gomes, 2012; O'Neill, 2012). Lastly but not least, availability of external support because many open source products have active online community support that may be able to provide support.

Open source software can be system software e.g. Linux, or application software which include content management software e.g., Web press etc. In this study Word press an online open source website creation tool based in PHP and MySQL, was used to develop web base platform for

reliable market linkage between farmers and potential buyers. The statistics below shows the usage of content management software by 2017.

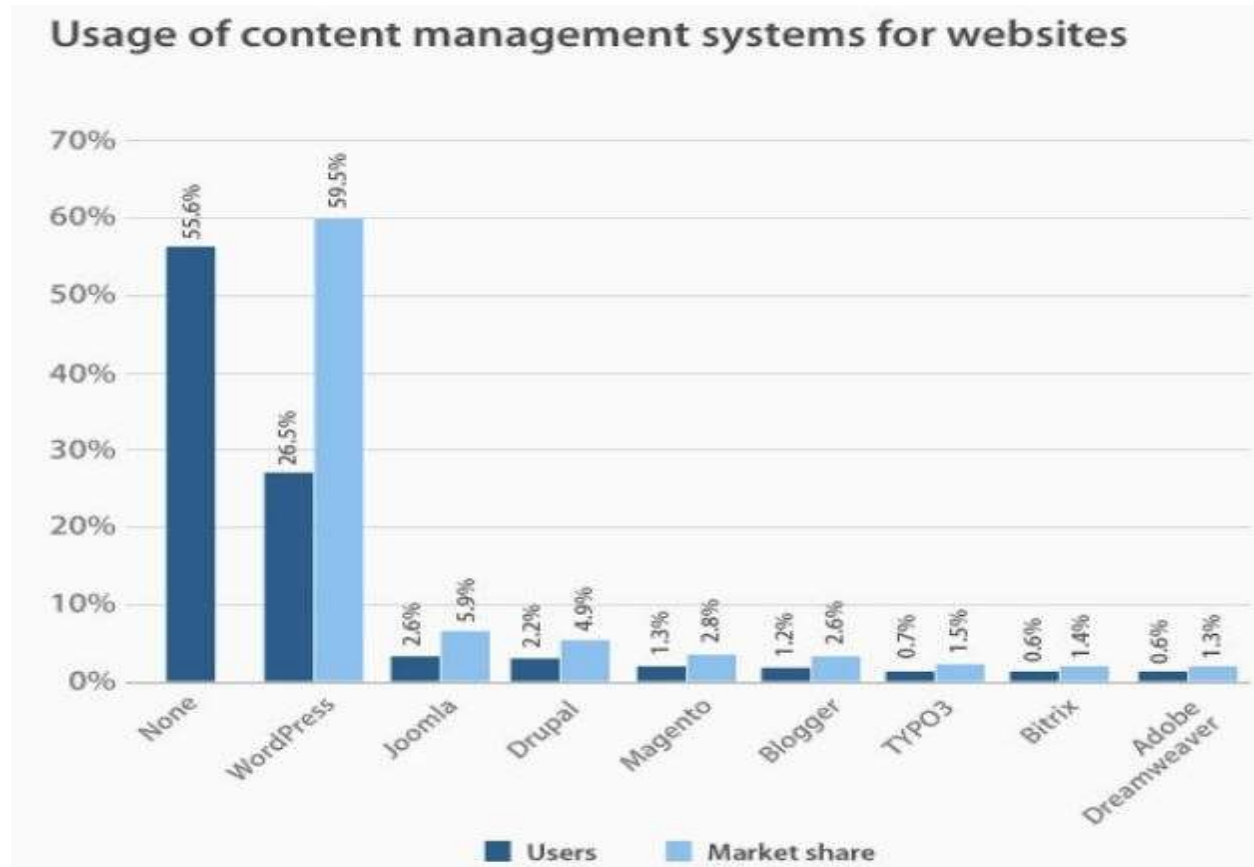


Figure 3: Usage of content management systems for website creation (Gina Smith 2017)

The new developed web based platform for market linkage is simple and not overloaded by information. All the required market information (farmer’s location, price, amount of poultry and poultry product, kind of poultry product and type of poultry) is available in the platform since all poultry farmer and buyers before advertising products and needs will be required to register first. Buyers upon selecting a particular product all the details regarding that product will be shown. Buyers (farmers, individual person, shops, catering services, supermarkets, hotels, industries, butchers and other farmers) can make orders and purchase poultry and poultry products form the platform. Each poultry farmer and buyer will be able to view and manage his orders. Through administrator farmers can do auctions. This web based platform also provides Poultry industry information such as poultry diseases and feeds. The web based platform available in English also

in Swahili. Figure 3 below show the interface of the web based platform for market linkage between poultry farmers and potential buyers

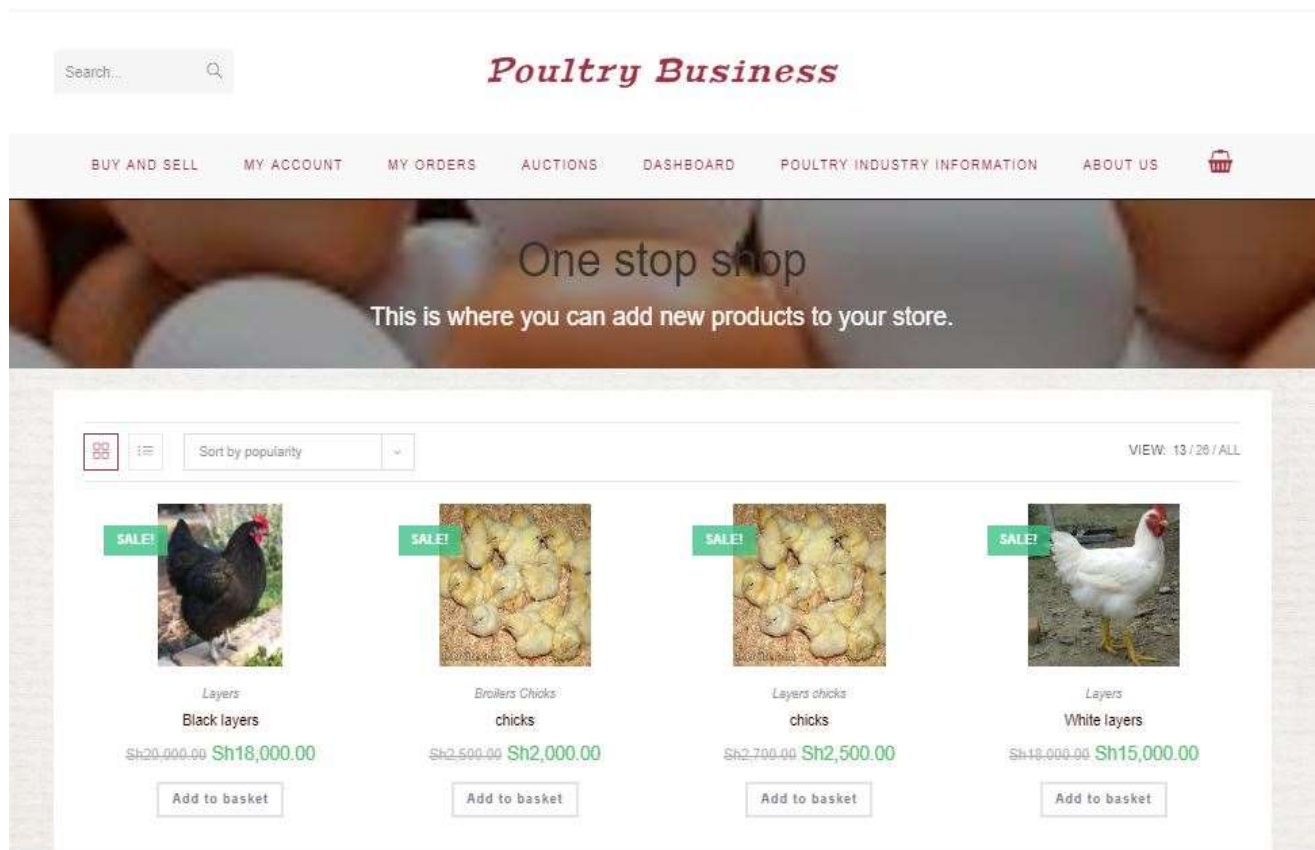


Figure 4: Interface of the web based platform for market linkage between poultry farmers and potential buyers in Tanzania, 2018

## 5. User Experience testing Experiment Design

In this study Eye tracking method combined with retrospective think aloud method and facial expression was used to test user experience of the web based platform for reliable market linkage between poultry buyers and potential buyers through evaluating the effectiveness of the developed web interface by examining emotional behaviour. If the interface, for example the home interface fails to clearly state what the website offer and what users can do on the site, people will leave” (Nielsen, 2012).

To study the user experience of this web application the population was poultry farmers. Simple random sampling method together with screening questionnaire was used to select participants. The study was held at the period of June to July 2018. The participants were

between 18 and 65 years old. The total sample size was 5 participants. The user experience test includes four tasks whereby each participant perform all the tasks. The task require the participant to create account, to find if someone has posted (advertisement) information about poultry and poultry products before you decide to buy, to find out where you can find more information about the advertised products, and to try to buy 20 eggs from the website. User experience was evaluated with the version of web based application (high fidelity prototype). During the session's participants was given short introductory statement to read to the subject that explains the purpose and procedure for the test. A pre-test questionnaire was conducted. While the user was performing tasks observation was made and detailed notice taken. The participants were asked to complete post testing questionnaire (System Usability Scale) to measure different aspects of user experience. Figure 4 below is user experience test model.

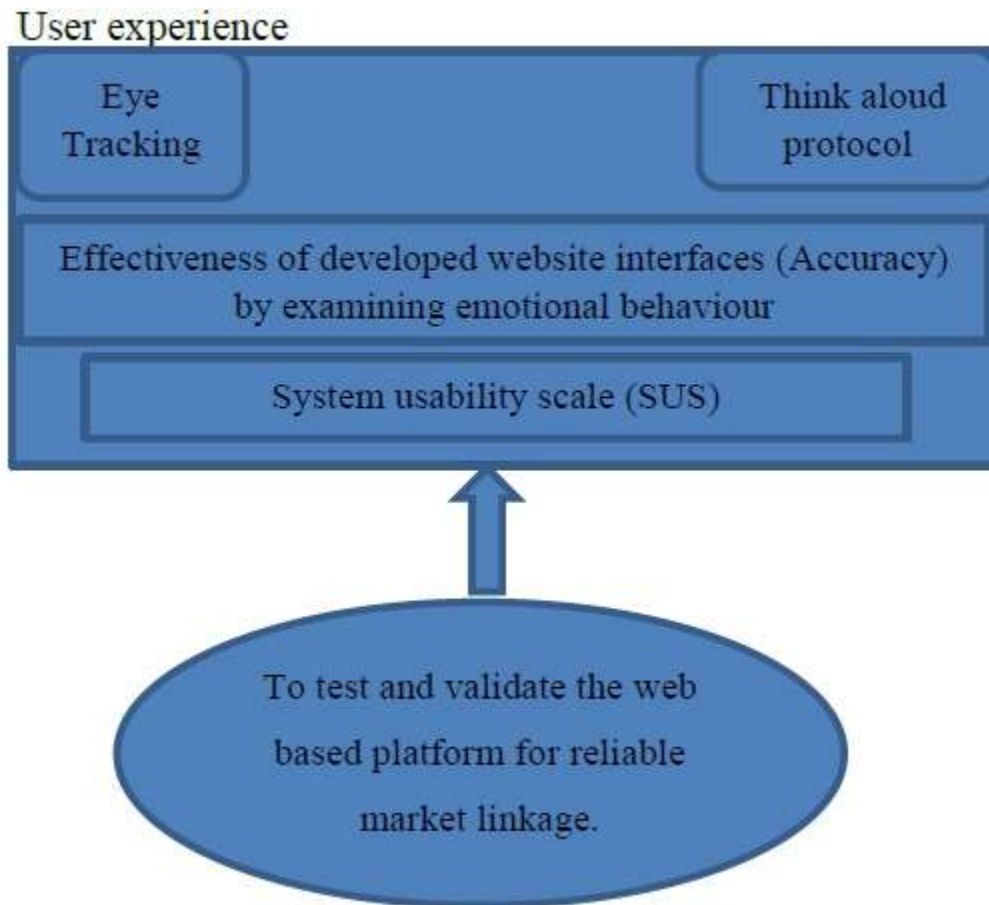


Figure 5: User experience Test model, 2018

## 6. Results

The data was analyzed using gaze plots and heat maps for user's entire visit to web based platform for market linkage together with think aloud data and facial expression and draw conclusion from these data.



Figure 6: The heat map image of a first user when interacting with web based platform for market linkage, 2018

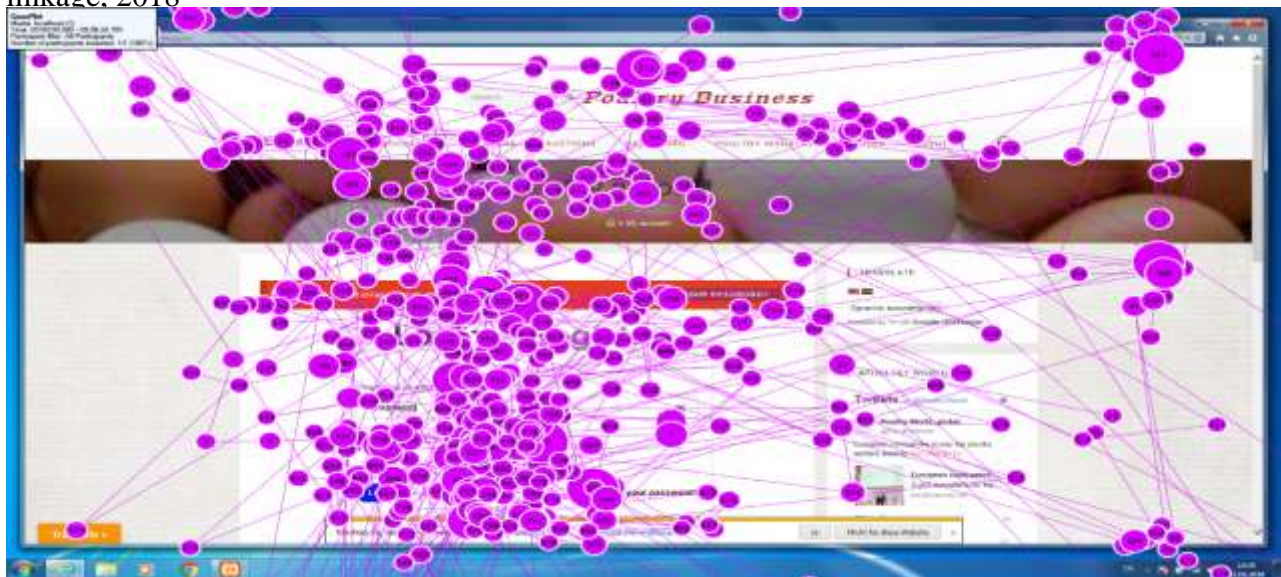


Figure 7: The gaze plot image of a last user when performing the tasks, 2018

Gaze plots and heat maps for all 5 users were analyzed and the results shows that a larger amount of attention was paid to the login page and checkout page of the website. People also look a little

bit to menu items. There is a smaller amount of attention to the right side of the website and there are almost no fixation (attention) to the right side of the website. These results shows that user spend a lot of time during creating account and during the checkout process, while spend little time on other parts of the website.

During the testing sessions participants were also asked to think out loudly. And the results were as follows

Participant	Task 1	Task 2	Task 3	Task 4
1	Mh!What is this!	I love it!	Very impressed!	Duh!
2	Daah!	Wow!	Good!	Duh!
3	-	Easy!	-	Good!
4	Uwiii!	Easy!	Wow!	What is this!
5	I don't know!	-	I like it!	I am confused!

Figure 8: Think aloud testing results, 2018

Testing administrator was taking detailed notes and record participant's behaviour including the facial expression of each participants during testing sessions. The results were as follows


















Participant	Task 1	Task 2	Task 3	Task 4
1				
2				
3	-		-	
4				
5		-		

Figure 9: Facial expression results, Emoji by super sad emoticon 2018.

The data from eye tracking, think aloud protocol and facial expression was combined together. The result shows that users were emotionally happy when performing the second and the third

tasks. But when performing the first task and the last task users were emotionally anxiety and disappointed. The eye tracking data (gaze plots and heat maps) shows that, users spend a lot of time when performing the first and the last tasks. Most of the think aloud data shows that, the users was wondering what to do when performing the first task and the last task. Also facial expression data shows the participants were not happy when performing the first and the last tasks.

The majority of participants (80%) agreed (agree or strong agree) they would use the website frequently. Most of the participants (60%) agreed the website was easy to use. 60% of the participants think that most people would learn to use the system very quickly and could become productive using this system. All participants (100%) would like to recommend this website to a friend. Only 40% of the participants think they will need help of technical person to use the website.

S/ N	Post Study usability questionnaire (System Usability Scale)	Strong agree	Agree	Disagree	Strong disagree	Percentage Agree
		1	2	3	4	
1	I think I would like to use this system frequently	3	1	1		80%
2	I thought the system was easy to use	2	1	1	1	60%
3	I would imagine that most people would learn to use this system very quickly		3	2		60%
4	I will need the help of a technical person to be able to use the system	1	1	2	1	40%
5	I believe I could become productive quickly using this system.	2	1	1	1	60%
6	I found various functions on the system were well integrated.		3	2		60%
7	I would recommend the system to a friend	3	2			100%

Figure 10: Usability System Scale results, 2018

## 7. Conclusion

User Experience is not about technology or interfaces, it is about creating a significant experiences through a device. Buley, (2013) and Hassenzahl (2012) said that UX design process is the entire process of design, acquiring and integrating a product or service. This includes the aspects of usability, accessibility, performance and other functionality. UX is a vast collection of other areas too. Think about all the stages of product or service, because a product is more than a product and it should be means integrated a set of experiences. If we want to achieve a great user experience we should design with not only consumption and use in mind but also the entire process of acquiring it, owning it even troubleshooting it. In UX design technology needs to be a collaborator (team work) and allow people to do what they can do rather than forcing them to act like machine, When designing if you will only think about technology then you will end up having a technological product that no one will use it (Horton, Quesenbery, & Media, 2013; Norman, 2017). Thinking broad and user involvement is always needed when designing, then we will get products that are truly designed for people.

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