

## Chapter 3

# Structural Modeling and Analysis of Barriers Encountered in Gamification Applications in Health

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### ABSTRACT

*Applications (apps) offer outstanding opportunities for healthcare services to serve individuals in areas that do not involve technology that improve healthcare outcomes, and that strengthen community health. These opportunities are becoming more common, especially with the increasing use of mobile devices in many segments of society. On the other hand, there are many obstacles that directly or indirectly affect the process of implementing gamification applications. In this study, the authors use Interpretive structural modeling (ISM) and MICMAC aiming to reveal the relations of obstacles encountered, and also to find the root cause of barriers in gamification engagement through applications used in health-care. Findings showed that the lack of functionality of the apps, having the highest driving power and lowest dependency, was determined as the root barrier whilst other barriers are also divided into levels.*

### INTRODUCTION

The widespread use of mobile devices, such as smartphones and tablets, increases the use of information technology in almost every field. One of the areas where mobile technologies are used is the health sector. Individuals using technology can track information, such as step counts, heart rate, and medication times, on their mobile devices. When the mobile health market is analyzed, applications (apps) developed for every age and need can be found. With advancing technology, the concept of gamification has come to

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the fore in applications that provide mobile health services. Gamification provides opportunities through motivation and rewards for individuals to follow their health. In gamification, using game techniques to make activities fun and attractive, users are encouraged to control their behavior and health. The most descriptive and widely used definition for the gamification approach is “the use of game design elements in non-game contexts”. Gamification can be a useful and exciting tool in situations that require motivation, encourage learning, and aid in problem-solving and communicating with others.

Despite its growing popularity, there are many challenges (i.e., obstacles, barriers) that directly or indirectly affect the process of implementing gamification applications—in general, getting smarter in many areas with the use of technology, statistical monitoring, and analyzing increase. On the other hand, gamification as the health concept’s motivation and learning basis provides a new model for individual’s behavioral change. Grounded from the vast use of gamification in European countries, although the internet and app usage are increasing correspondingly, there is a lack of gamification usage despite the technological developments. Therefore, the need to address the very novel issue in the lenses of an emerging country occurred. For this purpose, the authors aimed to respond to the main research question of what could be the reasons that challenge the individuals to use mHealth gamification? Given the prevalence of gamification, the authors focused on this research on the population that uses mHealth gamification.

This chapter presents a literature review discussing the barriers to gamification addressed in this study. Questionnaires were created, and user opinions were used to define the relationship of these obstacles. Following the description of the research methods, variables that represent the complex system of gamification are analyzed. Numerous methodologies have been developed to assess the interaction of system variables. Interpretive Structure Modeling (ISM) was developed to identify complex systems. ISM is defined as a computer-aided methodology used to describe the relationships between system elements. It is applied using graph theory, group decision-making, computer applications help, and the social sciences. The analysis of MICMAC (Matrice d’Impacts Croisés Multiplication Appliquée a un Classement/Cross Impact Matrix Multiplication Applied to Classification) analysis is conducted by considering the effects and dependency levels obtained from the accessibility matrix calculated by converting the relationships into numerical values. After defining the relationships between the obstacles encountered in health gamification apps, the influence and dependency levels are determined for all variables in the whole system.

## **BACKGROUND**

### **Gamification as a General Concept**

Gamification rose as a trend around 2010 as it began to be used around the world. This term was first translated in 2002 by Nick Pelling (Pelling, 2011), but it was too early for the concept to be adequately adopted (Jakubowski, 2014). However, today it appears with increasing momentum.

In a very broad manner, the term gamification is used in education, technology, behavior-changing mechanisms in companies, marketing, and the commercial world. The technology’s expansion has further become an industry, not only for inventors but also for academics interested in studying it as a scholarly subject. As more studies reveal gamification’s efficient outcomes, more interdisciplinary questions are asked on where and how gamification can go forward. The overall concept of gamification can be framed as an incentive for influence. In terms of defining gamification, it is emphasized that the use

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