CHAPTER I
INTRODUCTION

1.1 Background

Recently, concept of functional food has gained interest lately from many parties as the increasing awareness from society on the high level and danger of chronic diseases. Eventually, there is no universally accepted definition for functional food. However, several definitions have been proposed by various organizations in several countries.

Functional Food Science in Europe (FUFOSE) defined functional food as “food which could affect beneficially to one or more target functions in body, beyond adequate nutritional effects, in a way relevant to an improved state of health and well-being and/or reduction of risk disease. It is consumed as part of a normal food pattern. It is not a pill, a capsule or any other form of dietary supplement.” (Chadwick, 2003). Ministry of Health, Labor, and Welfare in Japan defined food for specified health use (FOSHU) as “foods which are, based on the knowledge concerning the relationship between foods or food components and health, expected to have certain health benefits, and have been licensed to bear a label claiming that a person using them for specified health use may expect to obtain the health use through the consumption”. In Australia, Food Standard Australia New Zealand (FSANZ) defined functional food as “foods that are similar in appearance to conventional foods and are intended to be consumed as a
part of a usual diet, but have been modified to have physiological roles beyond the provision of simple nutrient requirements” (Corbo et al, 2014).

Tempeh has been long known as one of Indonesian traditional foods and has been believed as one of the most reliable protein sources. Some researches show that tempeh also had its own benefit in health perspective. Since these findings, many industry and researchers put their interest to develop tempeh into functional food. As a functional food, tempeh can be categorized as the cheapest option. Other than that, during tempeh fermentation, several nutrients, such as cellulose, protein, and lipid undergo hydrolysis by *Rhizopus oligosporus* and resulting in components which are easier to be absorbed by human body. Flatulent-causing stachyose which is commonly found in soybean have reduced significantly through fermentation. Moreover, tempeh is one of the highest sources of isoflavone (based on wet weight) and its isoflavone availability has increased as fermentation altered isoflavone glycoside to its respective aglycone which is more readily available to body. Higher vitamin B content is also observed in tempeh rather than in soybean. Its dietary fiber also increased due to development of fiber rich mold mycelium (Duenas et al, 2012; Hui et al, 2004).

Meanwhile, rice is known to serve as staple food in Indonesia as source of carbohydrate. It is also has been long known that red rice is better than white rice as it contains more fiber, more vitamin, and more antioxidant component (Savitha and Singh, 2011). It has been suggested that red rice had higher amount of phytochemical compound, which majorly constituted by flavan-3-ol and γ-oryzanol, compared to white rice. Several studies have demonstrated the possible health benefit of red rice, such as reduced progression of atherosclerosis plaque
development (Ling et al., 2001) and retarded cancer cells metastasis (Pintha et al., 2014). However, because of its taste and texture, red rice is not as popular as white rice.

In term of product diversification, tempeh and red rice are in the same position. Currently, consumption of tempeh and red rice are merely as main course meal. Derivative products from both materials are still limited. The combination of tempeh and red rice in beverage is one effort to create new product diversification. Minimal heat treatment during beverage processing is expected to be able to preserve the functional and nutritional content of the materials. Therefore, this research is aimed to find the formulation of tempeh and red rice beverage with favorable stability and acceptable sensory properties and also to assess its functional properties of the product in term of its antioxidant.

1.2 Research Problem

Tempeh has been known to be a potential functional food as it might offer health benefit. However, currently product diversification from tempeh is still limited. Previous research conducted by Mulyani (2013) found several problems in applying tempeh as beverages, such as low organoleptic acceptance and occurrence of undesirable sedimentation. An instant tempeh beverage posed the same problem with precipitation. To the knowledge of writer, there is no acceptable existing tempeh-based ready-to-drink beverage in the market.

Red rice is also known with its health benefit. Incorporation of red rice into tempeh beverage is expected to increase tempeh beverage acceptance as some part of society might not be able to accept the strong beany flavor from tempeh.
The development of new type of ready-to-drink product utilizing both materials that is stable and acceptable may increase the consumption of those materials leading to higher intake of their functional value.

Prior eaten, tempeh would eventually have to be initially cooked. Steaming and baking are the easiest ones. In general, all cooking process will eventually enhance flavor of food. A different tempeh pre-treatment is conducted to assess the method of cooking producing better acceptance by panelist. In order to reduce the sedimentation or precipitation as well as giving a better mouthfeel, the optimum concentration of xanthan gum added as stabilizer in the beverage is also determined in this study. Several assessments in regards of antioxidant were carried to assess the effect of processes towards functional content of the beverage.

1.3 Objectives
1.3.1 General Objectives

The general objective of this research is to find the formulation of tempeh and red rice ready-to-drink beverage which is not only stable, but also able to be accepted by consumers and to assess its functional properties.

1.3.2 Specific Objectives

The specific objectives of this research are:

1. To investigate the effect of tempeh pre-treatment and ratio between tempeh to red rice towards the sensory acceptability of the beverage.

2. To investigate the effect of various xanthan gum concentration towards the stability, viscosity, and sensory acceptability of the beverage.
3. To determine the optimal tempeh pre-treatment, ratio of tempeh to red rice and xanthan gum concentration for obtaining a stable ready-to-drink beverage.

4. To assess the functional properties maintained in the tempeh ready-to-drink beverage including total phenolic content, total flavonoid content, and antioxidant activity.