1. Introduction

A landslide is the movement of a debris, rock, or soil mass down the slope and is one of the most frequently occurring natural disasters in mountain areas that puts lives and properties of the people at risk [1–3]. Landslides occur in smaller scales than other natural disasters, but have higher distribution and are more dangerous in many cases [4]. Landslides lead to the evolution of landforms and are considered as the biggest threat in a great number of regions all around the world [5]. Based on the reports of the Centre for Research on the Epidemiology of Disasters (CRED), landslides are the cause of 17% of all casualties of natural hazards in the world [6]. Some researchers expect this trend to increase in the future with the increase in urbanization, deforestation, and changes in climate conditions [2,7]. The damages due to the occurrence of landslides are also predicted to rise in the subsequent decades with population growth, progression of residential areas and infrastructure in high-risk areas, continuing deforestation, and the increase in regional precipitation [3].

One of the main approaches for developing hazard reduction strategies is creating the landslide susceptibility sap (LSM). The LSM can provide spatial distribution of potential slope failures, thus has a significant role in risk mitigation of landslides. Van Den Eeckhaut et al. [8] stated that landslides were more likely occur in the areas with the background of occurrences of landslides. A recent work combined LSM with rainfall threshold to have both spatial and temporal forecasting of landslide occurrences [9].

In the past two decades, substantial research studies on LSM have been conducted worldwide. Many scholars have tried different approaches to creating LSMs. In addition to crisis planning, LSMs are crucial for identifying the areas prone to the risk of landslides as well as managing and reducing the risk [10]. These maps can be provided using an appropriate model by having the landslide data and a set of independent variables [7]. There are three main groups of landslide susceptibility methods, including innovative, deterministic, and statistical [11]. The basis of the innovative models is the opinion of the experts in identifying the weight of each factor. Thus, this type of models has a high potential for error [12,13]. Deterministic models are developed on the basis of mathematical relationships. These models are based on the physical laws, which require calculating the relationship between the resistance forces and drivers of mass movements [14].

Recently, with the advancements in the commercial world, remote sensing, and quick access to geographic information system (GIS) data in natural hazard mapping, landslide modeling has been improved [15]. Many studies on LSM have been conducted using the frequency ratio (FR) [16,17], weight of evidence (WoE) [17], evidential belief function (EBF) [15], artificial neural networks [18–20], neuro-fuzzy systems [21,22], fuzzy logic [23,24], analytical hierarchy processes (AHPs) [25], Shannon entropy (SE) [6], logistic regression [5], and statistical index [3,5] in GIS. Some of the aforementioned techniques have been utilized in other fields of study, such as identification of flood-prone areas [26,27].

Zhang et al. [28] studied landslides in China by combining the statistical index and AHP methods to prepare LSMs. They stated that residential areas and sporadic forests with geological units of red layered moderate soft mixture of clastic rocks placed in altitude class of 0–200 m were quite prone to landslides. In Iran, landslides have been most frequently reported in Mazandaran province, Iran [29]. Klijanrestagh Watershed, located in Mazandaran, is one of the areas with a high risk of landslides due to special physiographic and climatic conditions, geological formations susceptible to the occurrence of landslides, and many villages in the highlands.

As landslides frequently occur in the area under study, this research study was basically aimed at investigating the areas with the potential of the occurrence of future landslides in order to manage and reduce losses. Another objective is to identify the major factors of the occurrence of landslides in the area under study using FR, SE, WoE, and EBF, and finally, evaluate the performance of these models in the identification of landslide-prone areas.