

Section 1 Introduction

Nowadays, the use of gadgets has become essential in most human activities. According to data from the Badan Pusat Statistik (BPS), in 2022, smartphones accounted for 67.88% of gadget ownership in Indonesia, while computers, laptops, and tablets comprised 18.04%. This data is consistent with the significant growth observed in gadget sales in Indonesia [1]. The rapid expansion of the gadget industry has resulted in a wide array of products available in the market. Due to the large selection of various products, customers must spend more time searching for gadgets that suit their needs. Gadgets are products with many variations and complex technical specifications, which only some people have in-depth knowledge about [2]. Therefore, there is a need for a system that can provide gadget recommendations based on customer needs so that they no longer need extensive knowledge of technical specifications.

Conversational recommender systems (CRS) utilize interactive conversations to recommend products based on user preferences [3]. The user and the system interact until the user's preferences become sufficiently specific [4]. CRS employs two navigation techniques: navigation-by-asking (NBA) and navigation-by-proposing (NBP). In NBA, the system repeatedly poses questions to users to identify their preferences [5]. On the other hand, NBP involves the user providing feedback on product samples the system presents. The interaction concludes when the user selects one of the recommended products. Baizal et al. developed a recommender system that combines both navigation methods by utilizing ontology as a knowledge representation [6]. This system aims to generate conversational interactions resembling those between salespeople and potential buyers. Another framework, ConveRSE (Conversational Recommender System Framework), was developed by Andrea et al. [7]. It integrates a digital assistant with a conversational recommender system and operates as a chatbot capable of recommending items across various domains. Yaxiong et al. conducted a study on developing a conversational recommender system for fashion recommendations [8]. Their system incorporates multimodal interaction and can receive feedback in the form of positive and negative natural language expressions.

A knowledge-based recommender system generates recommendations using domain-specific knowledge about how item specifications can satisfy user desires and preferences [9]. Conversational recommender systems are a type of knowledge-based recommender system. Interactions in conversational recommender systems rely on domain specific knowledge. Conversational recommender systems require a knowledge domain to perform interactions. Ontology is a prevalent knowledge representation technique in recommender systems [10]. Charbel et al. developed a recommender system for suggesting college majors, using ontology to model student profiles and match them with alum interest profiles [11]. Similarly, Gerry et al. employed ontology as the foundation for a music knowledge base, mapping the user's musical preferences to music elements [12].

A gadget recommender system was previously developed using the K-means algorithm [13]. However, this system required users to input the technical specifications of the gadgets they needed. In a study by Marc et al. [14], a cognitive critique-based recommender system was integrated to recommend smartphones. The interaction in their design focused on critiques based on product specifications. Similarly, Chen et al. [15] created a camera recommender system by combining a critique-based approach with user reviews but still relied on questions about technical specifications. The mentioned studies [13]–[15] were limited in their interactions, as they were based on product specifications. It is a limitation that not all users are familiar with or knowledgeable about the technical requirements of the gadgets they need. Therefore, the main contribution of this research is to implement a Conversational Recommender System (CRS) framework based on interaction on functional requirements [6] to recommend gadgets. In this CRS, the interaction is designed around the gadgets' functional

requirements, allowing novice users with gadget specifications to find products that suit their needs. The gadget product coverage in this research includes smartphones, all-in-one PCs, laptops, and tablets.

