

INTISARI

Revolusi industri 4.0 mendorong perkembangan sistem otomasi ke segala bidang untuk tercapainya produktivitas yang optimal. Salah satu prinsip dan tujuan diterapkannya otomasi adalah untuk mencapai desentralisasi keputusan, yaitu kemampuan *cyber physical system* untuk membuat keputusan dan melakukan pekerjaan se-otomatis mungkin tanpa campur tangan manusia. Apabila kondisi ideal ini tercapai, maka efektivitas dan efisiensi pekerjaan akan meningkat. Permasalahannya adalah kesulitan untuk mencapai kondisi sistem otomasi yang ideal dikarenakan beberapa kasus dengan kompleksitas tinggi dan informasi kontekstual yang belum dapat diterjemahkan dengan baik oleh sistem. Sehingga perlu dievaluasi pada kondisi yang bagaimanakah peran manusia dan otomasi lebih dibutuhkan.

Pada penelitian ini, peran manusia dan otomasi yang masing-masing direpresentasikan oleh penilaian ahli dan model statistik dalam meramalkan permintaan dievaluasi menggunakan matriks Ansoff. Dalam matriks Ansoff terdapat empat kombinasi *market* dan *product development*, yaitu *emerging market & new product*, *mature market & new product*, *emerging market & old product*, serta *mature market & new product*. Peran penilaian ahli dan model statistik dianalisis dengan cara mengevaluasi bobot kepentingannya dalam peramalan kombinasi menggunakan metode *constrained OLS*. Selanjutnya nilai akurasi peramalan kombinasi dibandingkan dengan penilaian ahli untuk mengetahui signifikansi pengaruh penerapan peramalan kombinasi. Kemudian pengaruh faktor *market*, *product development* dan interaksinya dianalisis menggunakan metode *two-way ANOVA* untuk mengetahui faktor manakah yang berpengaruh signifikan dalam menentukan bobot peran optimal peramalan kombinasi.

Hasil penelitian menunjukkan bahwa penerapan peramalan kombinasi berpengaruh signifikan meningkatkan akurasi peramalan pada hampir semua kondisi, kecuali pada kondisi *mature market & old product*. Didapatkan pula bahwa peran model statistik lebih baik dibandingkan penilaian manusia untuk meramalkan permintaan pada kondisi *new product*, sedangkan pada kondisi *old product* peran model statistik dan penilaian ahli cenderung seimbang.

Kata kunci: Otomasi, Peramalan, Penilaian Ahli, Model Statistik, Peramalan Kombinasi, Matriks Ansoff, *Product*, *Market*.

ABSTRACT

Revolution of Industry 4.0 is driving the development of automation systems in many sectors to achieve optimal productivity. One of the principles and objectives of implementing automation is to achieve decentralized decisions, the ability of automation systems to make decisions and do work as automatically as possible without human intervention. If this ideal condition is achieved, the effectiveness and efficiency of work will increase. The problem is the difficulty in achieving the ideal conditions of the automation system due to several cases with high complexity and contextual information that cannot be properly translated by the system. So it needs to be evaluated in which condition the role of humans and automation is more needed.

In this study, the role of humans and automation, each represented by expert judgements and statistical models in predicting demand, are evaluated using Ansoff matrix. In the Ansoff matrix there are four market and product development combinations, namely new markets & new products, mature markets & new products, new markets & old products, and mature markets & new products. The role of expert judgements and statistical models is analyzed by considering its weighted importance in combination forecasting using COLS method. Furthermore, the accuracy of combination forecasting compared with expert judgement to determine the significance of the combination forecasting application. Then the effect of market, product development factors and their interactions are analyzed using two-way ANOVA method to find out which factors have a significant effect in determining the optimal weighted importance for combination forecasting.

The results showed that the application of combined forecasting had a significant effect in increasing forecast accuracy in conditions of emerging markets & new products, mature markets & new products and emerging markets & old products. The role of statistical models is better than expert judgements to predict product demand under new product conditions, whereas in old product conditions the role of statistical models and expert judgment tends to be balanced.

Keywords: Automation, Forecasting, Expert Judgement, Statistical Model, Combination Forecasting, Ansoff Matrix, Product, Market.