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Author(s)	江, 驊格
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Description	Supervisor:永井由佳里, 先端科学技術研究科, 博士

氏 名	Chiang Hua Ko
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論 文 審 査 委 員	主査 永井由佳里 北陸先端科学技術大学院大学 理事 内平 直志 北陸先端科学技術大学院大学 教授 由井蘭隆也 北陸先端科学技術大学院大学 教授 郷右近英臣 北陸先端科学技術大学院大学 准教授 Max LO National Chin-Yi University of Technology Assoc. Prof.

## 論文の内容の要旨

This dissertation mainly focusing on the effect and performance of Enterprise Collaboration Systems (ECS) in Small and Medium Enterprises (SMEs). The dissertation includes three stages; Stage 1. Elucidating the ECS "SuccMail" design feature on the performance of SMEs. Stage 2. Focus on the effect of external support and internal support for implementing ECS. Stage 3. Develop and validate an instrument to measure the performance of linking ERP to ECS.

We knew that SMEs account for the primary source of employment in developed and developing countries, technological advancements, and competitive advantages. Besides, due to the Covid-19 Collaboration becomes increasingly valuable to the enterprise; also, a growing number of enterprises had implemented the Enterprise Collaboration Systems (ECS).

Nowadays, email and instant messages have become unproductive tools. The research indicates email and instant messages having issues of information overload, including a large amount of incoming information, inefficient workflow, and deficient communication quality. In terms of an enterprise, most of the current research result struggles to achieve specific and practical goals by proposed theoretical findings in the ERP domain. To enable the managers to get a fuller picture of all the messages generated from an ERP system with the Enterprise Collaboration System (ECS) and improve collaboration and communication, we propose a complete method to develop an artifact-SuccERP based on the Design Science approach to carry out the integration. This integration of ERP and ECS with the post-implementation process is proved a systematic approach. But it still needs to be measured with the performance of the implementation.

First, the researcher introduces elucidating the ECS SuccMail design feature on the performance of SMEs. There are 7 design features. Concerning discussing SMEs' performance issues using ECS, the researchers considered four aspects: human resources, customer complaints, time issues, and communication issues. The researcher examined the relationships

among these effects and proposed our constructed framework for the investigation of the evaluation of ECS. To survey the effectiveness of each critical design feature of each performance, the questionnaire was designed to ask about the effectiveness of 7 design features on each of the 4 performances. The researcher found that the ECS of SuccMail is basically satisfied by the respondents, while not all of the features are used by the users. Even SuccMail has simplified the use of the system as much as possible; still, it is difficult for SMEs to fully exert the effectiveness of ECS without a dedicated consultant. This is actually the main reason that SMEs cannot successfully import ECS.

Stage 2 is focusing on the effect of performance from the supports of SuccMail. The supports are assorted into external support and internal support. The ECS company's supports are external supports, and the supports from the top manager or enterprise are internal supports. External support including; the ECS manual, online consultation and, external ECS expert consultant. Internal support including; the enterprise fully depends on using ECS to manage and communicate, the enterprise offers sufficient resources for using ECS, the enterprise had hired a full-time consultant for implementing ECS, and the enterprise conflicts have been reduced by using ECS. The researcher proposed a survey questionnaire to evaluate how the internal and external supports of SuccMail can affect the performance of SMEs. Each support has a positive influence on the implementation of SuccMail and can affect the business performance of SMEs. Based on our result, the internal supports are more significant than the external to impact the business performance of SME.

The primary purpose of stage 3 is to evaluate the performance of linking ERP and ECS. Because the management of SMEs has many problems of duplications work. To solve the duplications work problems, the researcher linked SuccMail with ERP and conducted a series of evaluations on the linked SuccMail and ECS effectiveness. This research is based on previous research on the integration of artifacts with ERP systems and ECS. Since most SMEs who have implemented ERP complain about duplications of work caused by ECS implementation, the researcher linked SuccMail with the user's current ERP. The research results show that this solves the doubts and complaints caused by employees' duplications of work. And users are satisfied with the linking of ERP and ECS. At this stage, the validity of the link between ERP and ECS was verified. User satisfaction shows that the problems of independent ERP and ECS duplications of work have been solved. In addition, management support, absorptive capacity, and user satisfaction also have a positive impact on the performance of SuccMail.

This dissertation uses SuccMail to discuss various SME e-management issues. First of all, the researcher verified Steinhüser's 2011 research in practice; ECS implementation in SMEs has performance and management advantages. Besides, in the ECS field, which is hugely lacking in the literature, the researcher used questionnaires and actual interviews with users to discuss

various internal and external support issues in SMEs implementing ECS. The researcher finds Internal support is far more critical than external support. This result allows the researcher to clearly understand SMEs' difficulties in introducing ECS under the current environment. After all, it is difficult for existing SMEs to find an expert who has good computer use capabilities and, at the same time, sufficient management capabilities.

**Keywords:** Small and Medium-Sized Enterprises (SMEs); Enterprise Collaboration System (ECS); SuccMail; Enterprise Resource Planning (ERP); Organization Internal Support; Organization External Support; Absorptive Capacity; User Satisfaction

### 論文審査の結果の要旨

本博士論文は、中小企業を中心としたビジネス環境において、Enterprise Collaboration System (ECS) の現状の課題を解決するための知識マネジメント技術について、システム要件の明確化と具体的な事例を通じた検証により、実際の利用の場面で効果を測定することで業務の効率化や利便性の向上が可能であることを示す研究である。

研究の方法として、中小企業のビジネスパフォーマンスの向上に求められる要件の仮説をたて、台湾企業のビジネス環境で使用されるべく開発されたシステム(名称：SuccMail)を活用することで、約2年間の使用実績として、データ採取と分析を行い、作業時間の節約や顧客の満足度の指標により、パフォーマンス向上に寄与する機能を特定することに成功した。収集したデータは量・質ともに十分であり、当該分野の発展につながると期待でき、実社会の実用場面でデータ採取したことの意義は高く評価できる。

全体の構想としては、企業に勤務する社会人としての立場で、実務的な視点を重視しつつも、知識科学としての学術的な考察とのバランスを取り、暗黙知と形式知の関係を意識しながらシステム評価を行うことで、単目的のビジネスサポート技術を超えた、複層的な軸で人間中心のシステム要件を見出しており、台湾のビジネス環境という限定的なケースを対象としつつ、一般化できる総合的な知見を得るに至っている点で、優れた学術的価値を有していると判断できる。論文の主要な部分は、上に述べた通り豊富なデータと、分析による具体的な効果の特定であるが、アンケート調査によるユーザ評価においても説得力ある結果を示すとともに、システム改良や将来的発展へのヒントを見出している。文献研究については、ECSを中心に他の事例や研究を踏まえ、狭い範囲ではあるがシステム実装の課題を明確化している。これをコアに、さらに広範で多様なビジネスで活用されるコラボレーション技術やパフォーマンス向上の方策について、議論を蓄積することで、実践的な知識マネジメントをデザインする上で更に有用性の高い研究へと発展することが見込まれる。

以上、本論文は、Enterprise Resource Planning における Enterprise Collaboration System の効果について実践的に検証し考究したものであり、実社会のみならず、学術的に貢献するところが大きい。よって博士(知識科学)の学位論文として十分価値あるものと

認めた。