Influential Article Review - Is Open Innovation the Key to Improving Products?

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This paper examines innovation. We present insights from a highly influential paper. Here are the highlights from this paper: In late years, the concept of open innovation received attention from industry and academia. This concept means that firms utilize resources outside for their R&D beyond their boundaries. Behind this background is the fact that firms have more opportunities to utilize resources outside. Previous studies indicate that by utilizing resources outside, firms could make the R & D process more efficient or create new products. On the other side of the coin, we have to solve some aspects in an open innovation context. First, product quality on the basis of activities of open innovation has to be defined. The definition of product quality is still unclear; thus, it is necessary to identify product quality in open innovation context. In addition, comparison between open innovation and in-company cooperation is not done so much. In the examination of effectiveness of open innovation, we should compare utilization of resources outside with that of in-company ideas. In this paper, we quantitatively analyze relations among product quality, utilization of resources outside, and utilization of internal resources on the basis of Covariance Structure Analysis. This analysis is based on a questionnaire survey at Japanese electronics firms in July 2015.For our overseas readers, we then present the insights from this paper in Spanish, French, Portuguese, and German.

Keywords: Open innovation, Product quality, In-company cooperation, Covariance structure analysis

SUMMARY

- Our research is an empirical study that investigates the activities of open innovation and in-company cooperation among Japanese manufacturing firms. Among Japanese manufacturing firms, we focused on big- or medium-sized electronics firms. To assess the relations in our hypotheses, a questionnaire of 110 question items for each question type was designed. We used six-point Likert scales and structured questions to evaluate the question statements. The scale was assigned values from 1 to 6. For all questions, 1 means strongly disagree and 6 means strongly agree.
- The mail survey was administered to big- or medium-sized electronics firms in Japan. It was conducted from July 2015 to August 2015. In order to collect questionnaires, we selected 891

companies. Such companies were listed in the eol database provided by Pronexus Inc. We mailed 888 people and requested 25 people by email. The survey was directed to the president or the manager who were involved in the new product development process in the last 3 years.

- The structural model hypothesized was tested using AMOS. Before using AMOS, we confirmed unidimensionality and reliability about scales.
- Unidimensionality is a necessary condition for reliable and valid scales. Measurement scales are considered to be unidimensional if the items in the scale measure a single construct. The goodness of fit index and comparative fit index are often used to judge scale unidimensionality.
- Reliability is known as the consistency of the measurement. To assess reliability of the items, it is possible to confirm the quality of construct measurement. For this purpose, we calculated Cronbach's alpha for each scale. If the scale had a strong alpha value , the items were validated. Scales about the constructs «Identifying customer needs», «In-company cooperation» and «Creativity of members» showed alpha values greater than 0.70, so they have strong alpha values.
- Root Mean Square Error of Approximation is often used as a measure of discrepancy per degree of freedom. Its value of 0.05 indicates a close fit and that values less than 0.08 show reasonable errors of approximation in population . RMSEA values in our model were 0.046, so its value indicates a close fit.
- From our results shown in Fig. 2 and Table 5, the construct «Identifying customer needs» influences the constructs «Cooperation with others outsides» and «In-company cooperation» . Although the construct «In-company cooperation» has a significant effect on the «Creativity of members» , the «Cooperation with others outsides» does not directly influence the «Creativity of members» . The pass from «Cooperation with others outsides» to «Creativity of members» does not show a significant effect. However, the passage from «In-company cooperation» to «Creativity of members» shows a significant effect. Additionally, when calculating a total effect from an indirect effect and a direct effect of «Cooperation with others outsides» on «Creativity of members», a total effect shows a positive value .

HIGHLY INFLUENTIAL ARTICLE

We used the following article as a basis of our evaluation:

Ishikawa, T., & Suzuki, H. (2018). Relations between open innovation and product quality: an empirical study of Japanese electronics firms. International Journal of Quality Innovation, 4(1), 1–11.

This is the link to the publisher's website:
https://jqualityinnovation.springeropen.com/articles/10.1186/s40887-017-0020-y

INTRODUCTION

Japanese manufacturing firms have utilized technical capabilities in the new product development process, and they have built competitive advantages against foreign companies [26]. However, in recent years, there is a condition that their capabilities do not contribute to making new products. It is required to find and use new opportunities in the new product development process.

To complement technological capabilities, various firms tend to adopt open innovation. Particularly in high-tech manufacturing sectors, open innovation is more widely adopted [6]. In late years, the concept of open innovation receives attention from industry and academics. This concept means that firms utilize resources outside for their R&D beyond their boundaries [2]. Behind this background is the fact that firms have more opportunities to utilize resources outside. Previous studies indicate that by utilizing resources outside, firms could make the R & D process more efficient or create new products [3, 28].

Although the concept of open innovation receives attention, Japanese firms have a strong trend to improve their technological capabilities or make new products only by themselves [17]. This trend is like

"Not Invented Here" syndrome [19] which is a negative attitude to knowledge that originated from others outside [20]. For this reason, some researchers mentioned that Japanese firms depended on their own resources and they do not tend to adopt open innovation.

Although there are negative opinions about Japanese style, if they had plentiful internal resources, they should use more internal resources than resources outside with in-company cooperation. Some Japanese manufacturing firms have different departments in-house and there might be plentiful opportunities to utilize different resources with in-company cooperation [25]. Now, few researchers compare the effectiveness of open innovation with that of in-company cooperation. Therefore, we think that it is necessary to clarify the importance of open innovation in Japanese manufacturing firms through in-company cooperation. To clarify it, we also focus on product quality in the context of open innovation because it is necessary to judge the performance of open innovation or in-company cooperation. Based on some factors about open innovation or in-company cooperation, we set the hypotheses and propose one model.

In order to verify our hypotheses, we quantitatively analyze relations among product quality, utilization of resources outside and in-company cooperation on the basis of Covariance Structure Analysis. This analysis is based on a questionnaire survey at Japanese electronics firms in July 2015.

Our paper is structured as follows: first, we present a literature review of open innovation, creativity of members, in-company cooperation, and product quality. Next, we set our hypotheses and explain the proposed model. Then, we show the results of our survey and Covariance Structure Analysis. Finally, we address our conclusion and future research.

CONCLUSION

Through our analysis, our hypotheses were verified. As discussed in the process of making hypotheses, in-company cooperation seems to be more effective than cooperation with others outsiders in Japanese big or medium-sized firms. Such firms may have many different resources and knowledge in their own firms. Through sharing with members in other divisions or departments, members may obtain new ideas and utilize such ideas to make new products.

In this analysis, Japanese electronics firms seem to utilize in-company cooperation more effectively than cooperation with others outside. In addition, by using such cooperation, Japanese electronics firms enhance the creativity of their members who are involved in their new product development process and they produce new products which are unique in their market. This result implies that Japanese big firms have many potential opportunities to use resources in their own companies because they have several different departments and different resources or knowledge.

We have some tasks to research in the future. First of all, we have to research relations among other product quality, open innovation and in-company cooperation. In this paper, we focus on a part of the definition of product quality. Although we revealed relationships among the constructs "the uniqueness of new products", "open innovation" and "in-company cooperation", we could not solve the other relationships.

Secondly, we chose only electronics firms in Japan in this work. In our opinion, such firms are representative examples in manufacturing firms and we focused on them. But there are various firms which are different from electronics firms. In the future, by collecting questionnaires from other manufacturing firms, we'd like to compare Japanese firms.

Lastly, we made proposed models and questionnaires from conventional theories. In the researches of Open Innovation, only few works refer to in-company cooperation or product quality of new products and quantitative researches are still few. It is required to refine our model or questionnaires with this research.

APPENDIX

FIGURE 1
PROPOSED MODEL OF ANALYSIS

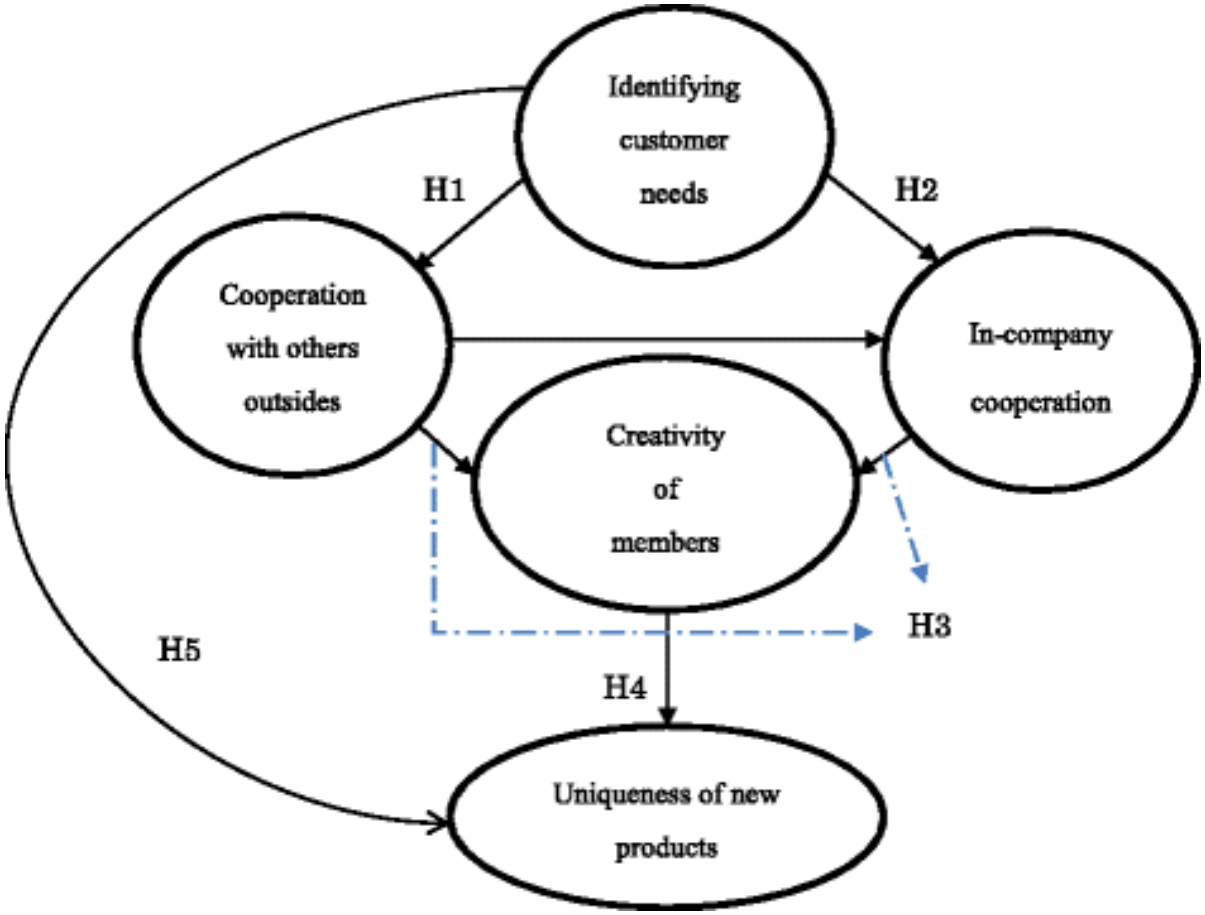

FIGURE 2
MODEL RESULTS

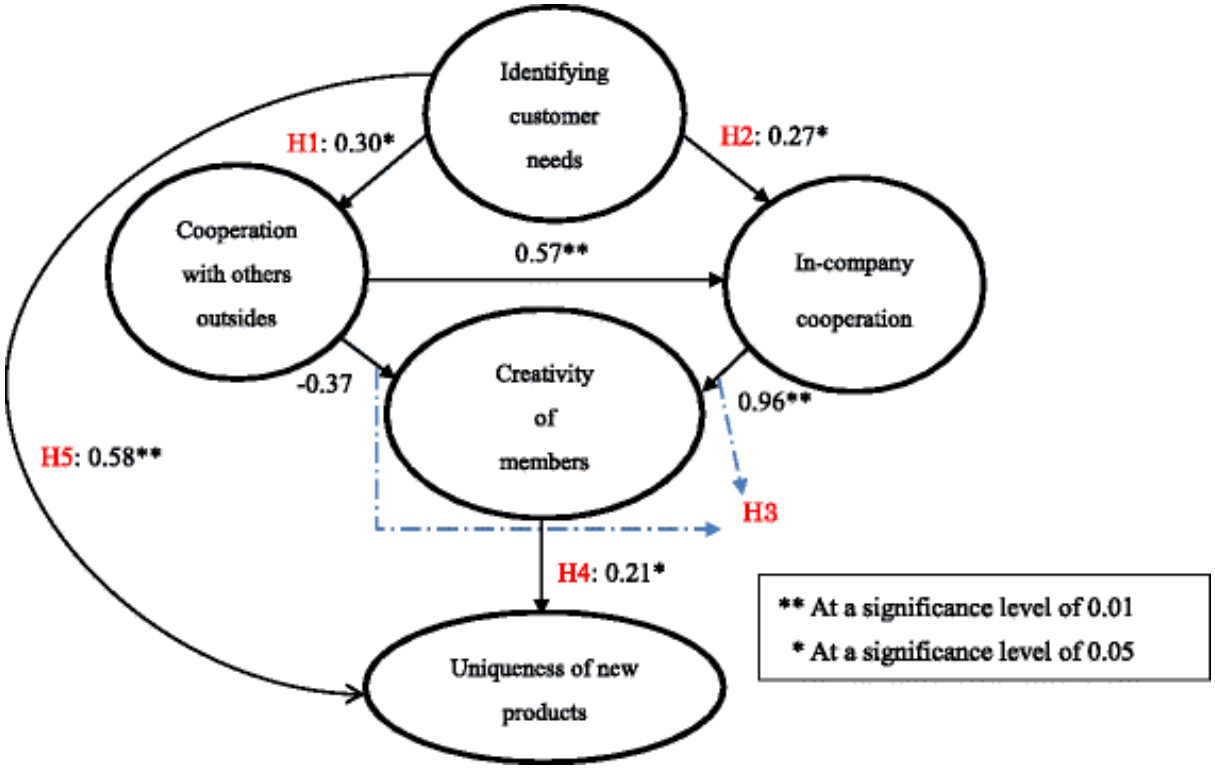

TABLE 1
RESPONSE SAMPLE COMPOSITION

Classification	**Description**
Company size	Large (Capital >300 million, the number of employees > = 300) and medium-sized firms (Capital >100 million, 100 = < the number of employees <999)
Industry type	Electronics (In Japan)
An attribute of respondents	The president or the manager who involve in new product development process in last 3 years
Response rate	12.49% (114 questionnaires)

TABLE 2
QUESTIONNAIRES USED FOR ANALYSIS

Model construct	**Mean value**	**Standard deviation**
Identifying customer needs		
Estimation of customer needs	3.71	1.01

Technological skills adapted with customer needs	3.87	1.04
Flexible support for customer needs	4.11	1.08
Cooperation with others outsides		
Opportunities to develop new products with others outsides	3.68	1.42
Systems to accept proposals from others outsides	3.40	1.32
Capabilities to connect own technologies with technologies outsides	3.23	1.18
In-company cooperation		
Communication across departments to communicate technological knowledges	3.54	1.26
Utilization of project teams which is across organizations	3.82	1.41
Utilization of project teams which is across organizations	3.73	1.28
Creativity of members		
Generation of innovative ideas	3.72	0.96
Findings about new ways to use facilities	3.80	0.95
Uniqueness of new products		
Number of novel products	3.02	1.34
Unique specifics of new products	4.03	1.12
Useful functions of new products	4.14	0.98

TABLE 3
RESULTS OF RELIABILITY ANALYSIS

Construct	**Cronbach's alpha**
Identifying customer needs	0.710
Cooperation with others outsides	0.602
In-company cooperation	0.638
Creativity of members	0.730
Uniqueness of new products	0.719

TABLE 4
GOODNESS OF FIT INDICES

Goodness of fit indices	**Value**
GFI	0.904
AGFI	0.855
CFI	0.960
RMSEA	0.046
CMIN/DF	1.243

TABLE 5
VALUES OF THREE EFFECTS

Effects	**Value**
Direct Effect	−0.37
Indirect Effect	0.55
Total effect	0.18

TABLE 6
SUMMARY OF RESULTS

Model hypotheses		**Results**
H1:	The more members try to identify customer needs, the more members try to use opportunities to cooperate with others outsides.	Supported ($p < 0.05$)
H2:	The more members try to identify customer needs, the more members try to use in-company cooperation.	Supported ($p < 0.05$)
H3:	In-company cooperation is more effective to highlight creativity of members than cooperation with others outsides.	Strongly supported ($p < 0.01$)
H4:	The more members have creativity, the more organizations produce the new unique products.	Supported ($p < 0.05$)
H5:	The more actively members try to identify customer needs, the more unique products are in the new product development process.	Strongly supported ($p < 0.01$)

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TRANSLATED VERSION: SPANISH

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

VERSION TRADUCIDA: ESPAÑOL

A continuación se muestra una traducción aproximada de las ideas presentadas anteriormente. Esto se hizo para dar una comprensión general de las ideas presentadas en el documento. Por favor, disculpe cualquier error gramatical y no responsabilite a los autores originales de estos errores.

INTRODUCCIÓN

Las empresas manufactureras japonesas han utilizado capacidades técnicas en el proceso de desarrollo de nuevos productos, y han construido ventajas competitivas contra empresas extranjeras [26]. Sin embargo, en los últimos años, existe la condición de que sus capacidades no contribuyan a fabricar nuevos productos. Es necesario encontrar y utilizar nuevas oportunidades en el nuevo proceso de desarrollo de productos.

Para complementar las capacidades tecnológicas, varias empresas tienden a adoptar la innovación abierta. En particular en los sectores manufactureros de alta tecnología, la innovación abierta se adopta más ampliamente [6]. En los últimos años, el concepto de innovación abierta recibe la atención de la industria y los académicos. Este concepto significa que las empresas utilizan recursos externos para su I+D más allá de sus límites [2]. Detrás de este trasfondo está el hecho de que las empresas tienen más oportunidades de

utilizar los recursos fuera. Estudios anteriores indican que al utilizar recursos externos, las empresas podrían hacer más eficiente el proceso de I+D o crear nuevos productos [3, 28].

Aunque el concepto de innovación abierta recibe atención, las empresas japonesas tienen una fuerte tendencia a mejorar sus capacidades tecnológicas o hacer nuevos productos sólo por sí mismas [17]. Esta tendencia es como el síndrome "No inventado aquí" [19] que es una actitud negativa al conocimiento que se originó de otros fuera [20]. Por esta razón, algunos investigadores mencionaron que las empresas japonesas dependían de sus propios recursos y que no tienden a adoptar la innovación abierta.

Aunque hay opiniones negativas sobre el estilo japonés, si tuvieran abundantes recursos internos, deberían utilizar más recursos internos que recursos externos con la cooperación en la empresa. Algunas empresas manufactureras japonesas tienen diferentes departamentos internos y podría haber numerosas oportunidades para utilizar diferentes recursos con la cooperación en la empresa [25]. Ahora, pocos investigadores comparan la eficacia de la innovación abierta con la de la cooperación en la empresa. Por lo tanto, creemos que es necesario aclarar la importancia de la innovación abierta en las empresas manufactureras japonesas mediante la comparación con la cooperación en la empresa. Para aclararlo, también nos centramos en la calidad del producto en el contexto de la innovación abierta, ya que es necesario juzgar el rendimiento de la innovación abierta o la cooperación en la empresa. Basándonos en algunos factores sobre la innovación abierta o la cooperación en la empresa, establecemos las hipótesis y proponemos un modelo.

Con el fin de verificar nuestras hipótesis, analizamos cuantitativamente las relaciones entre la calidad del producto, la utilización de recursos fuera y la cooperación en la empresa sobre la base del Análisis de Estructura de Covarianza. Este análisis se basa en una encuesta de cuestionarios realizada en empresas japonesas de electrónica en julio de 2015.

Nuestro documento se estructura de la siguiente manera: en primer lugar, presentamos una revisión bibliográfica de la innovación abierta, la creatividad de los miembros, la cooperación en la empresa y la calidad del producto. A continuación, establecemos nuestras hipótesis y explicamos el modelo propuesto. A continuación, mostramos los resultados de nuestra encuesta y análisis de estructura de covarianza. Por último, abordamos nuestra conclusión y nuestra futura investigación.

CONCLUSIÓN

A través de nuestro análisis, nuestras hipótesis fueron verificadas. Como se discutió en el proceso de hacer hipótesis, la cooperación en la empresa parece ser más eficaz que la cooperación con otras empresas ajenas en las grandes o medianas empresas japonesas. Estas empresas pueden tener muchos recursos y conocimientos diferentes en sus propias empresas. Al compartir con miembros de otras divisiones o departamentos, los miembros pueden obtener nuevas ideas y utilizar esas ideas para crear nuevos productos.

En este análisis, las empresas de electrónica japonesas parecen utilizar la cooperación en la empresa de manera más eficaz que la cooperación con otras personas externas. Además, mediante el uso de esta cooperación, las empresas de electrónica japonesas potencian la creatividad de sus miembros que participan en su nuevo proceso de desarrollo de productos y producen nuevos productos que son únicos en su mercado. Este resultado implica que las grandes empresas japonesas tienen muchas oportunidades potenciales de utilizar los recursos en sus propias empresas porque tienen varios departamentos diferentes y diferentes recursos o conocimientos.

Tenemos algunas tareas que investigar en el futuro. En primer lugar, tenemos que investigar sobre las relaciones entre otros productos de calidad, innovación abierta y cooperación en la empresa. En este artículo, nos centramos en una parte de la definición de la calidad del producto. Aunque revelamos relaciones entre las construcciones "la singularidad de los nuevos productos", la "innovación abierta" y la "cooperación en la empresa", no pudimos resolver las otras relaciones.

En segundo lugar, elegimos sólo las empresas de electrónica en Japón en este trabajo. En nuestra opinión, estas empresas son un ejemplo representativo en las empresas manufactureras y nos centramos en ellas. Pero hay varias firmas que son diferentes de las empresas de electrónica. En el futuro, al recopilar cuestionarios de otras empresas manufactureras, nos gustaría comparar a las empresas japonesas.

Por último, hicimos modelos y cuestionarios propuestos a partir de teorías convencionales. En las investigaciones de la Innovación Abierta, sólo unos pocos trabajos se refieren a la cooperación en la empresa o la calidad del producto de nuevos productos y las investigaciones cuantitativas son todavía pocas. Es necesario refinar nuestro modelo o cuestionarios con esta investigación.

TRANSLATED VERSION: FRENCH

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

VERSION TRADUITE: FRANÇAIS

Voici une traduction approximative des idées présentées ci-dessus. Cela a été fait pour donner une compréhension générale des idées présentées dans le document. Veuillez excuser toutes les erreurs grammaticales et ne pas tenir les auteurs originaux responsables de ces erreurs.

INTRODUCTION

Les entreprises manufacturières japonaises ont utilisé des capacités techniques dans le nouveau processus de développement de produits, et elles ont acquis des avantages concurrentiels par rapport aux entreprises étrangères [26]. Cependant, ces dernières années, il ya une condition que leurs capacités ne contribuent pas à faire de nouveaux produits. Il est nécessaire de trouver et d'utiliser de nouvelles opportunités dans le nouveau processus de développement de produits.

Pour compléter les capacités technologiques, diverses entreprises ont tendance à adopter l'innovation ouverte. En particulier dans les secteurs de la fabrication de haute technologie, l'innovation ouverte est plus largement adoptée [6]. Dans les dernières années, le concept d'innovation ouverte reçoit l'attention de l'industrie et des universitaires. Ce concept signifie que les entreprises utilisent des ressources extérieures pour leur R&D au-delà de leurs frontières [2]. Derrière ce contexte se trouve le fait que les entreprises ont plus de possibilités d'utiliser des ressources à l'extérieur. Des études antérieures indiquent qu'en utilisant des ressources à l'extérieur, les entreprises pourraient rendre le processus de R-D plus efficace ou créer de nouveaux produits [3, 28].

Bien que le concept d'innovation ouverte attire l'attention, les entreprises japonaises ont une forte tendance à améliorer leurs capacités technologiques ou à fabriquer de nouveaux produits par elles-mêmes [17]. Cette tendance est comme le syndrome « Not Invented Here » [19] qui est une attitude négative à l'égard de la connaissance qui provient d'autres personnes extérieures [20]. Pour cette raison, certains chercheurs ont mentionné que les entreprises japonaises dépendaient de leurs propres ressources et qu'elles n'avaient pas tendance à adopter l'innovation ouverte.

Bien qu'il y ait des opinions négatives sur le style japonais, s'ils avaient des ressources internes abondantes, ils devraient utiliser plus de ressources internes que les ressources à l'extérieur avec la coopération en entreprise. Certaines entreprises manufacturières japonaises ont différents départements à l'interne et il pourrait y avoir de nombreuses possibilités d'utiliser différentes ressources avec la coopération en entreprise [25]. Aujourd'hui, peu de chercheurs comparent l'efficacité de l'innovation ouverte à celle de la coopération en entreprise. Par conséquent, nous pensons qu'il est nécessaire de clarifier l'importance de l'innovation ouverte dans les entreprises manufacturières japonaises en comparant avec la coopération en entreprise. Pour le clarifier, nous mettons également l'accent sur la qualité des produits dans le contexte de l'innovation ouverte, car il est nécessaire de juger de la performance de l'innovation ouverte ou de la coopération en entreprise. Sur la base de certains facteurs liés à l'innovation ouverte ou à la coopération en entreprise, nous établissons les hypothèses et proposons un modèle.

Afin de vérifier nos hypothèses, nous analysons quantitativement les relations entre la qualité des produits, l'utilisation des ressources en dehors et en entreprise sur la base de l'analyse de la structure de

covariance. Cette analyse est basée sur une enquête par questionnaire menée auprès d'entreprises japonaises d'électronique en juillet 2015.

Notre article est structuré comme suit : tout d'abord, nous présentons un examen de la littérature sur l'innovation ouverte, la créativité des membres, la coopération en entreprise et la qualité des produits. Ensuite, nous avons établi nos hypothèses et expliqué le modèle proposé. Ensuite, nous montrons les résultats de notre enquête et de l'analyse de la structure de la covariance. Enfin, nous abordons nos conclusions et nos recherches futures.

CONCLUSION

Grâce à notre analyse, nos hypothèses ont été vérifiées. Comme nous l'avons vu dans le processus de fabrication d'hypothèses, la coopération en entreprise semble être plus efficace que la coopération avec d'autres entreprises extérieures dans les grandes ou moyennes entreprises japonaises. Ces entreprises peuvent avoir de nombreuses ressources et connaissances différentes dans leurs propres entreprises. En partageant avec les membres d'autres divisions ou ministères, les membres peuvent obtenir de nouvelles idées et utiliser de telles idées pour fabriquer de nouveaux produits.

Dans cette analyse, les entreprises japonaises d'électronique semblent utiliser la coopération en entreprise plus efficacement que la coopération avec d'autres personnes extérieures. En outre, en utilisant cette coopération, les entreprises d'électronique japonaises renforcent la créativité de leurs membres qui participent à leur nouveau processus de développement de produits et ils produisent de nouveaux produits qui est unique sur leur marché. Ce résultat implique que les grandes entreprises japonaises ont de nombreuses possibilités potentielles d'utiliser les ressources dans leurs propres entreprises parce qu'elles ont plusieurs départements différents et des ressources ou des connaissances différentes.

Nous avons des tâches à accomplir à l'avenir. Tout d'abord, nous devons faire des recherches sur les relations entre autres qualité des produits, l'innovation ouverte et la coopération en entreprise. Dans cet article, nous nous concentrons sur une partie de la définition de la qualité du produit. Bien que nous ayons révélé des relations entre les constructions « l'unicité de nouveaux produits », « l'innovation ouverte » et la « coopération en entreprise », nous n'avons pas pu résoudre les autres relations.

Deuxièmement, nous n'avons choisi que des entreprises d'électronique au Japon dans ce travail. À notre avis, ces entreprises sont des exemples représentatifs dans les entreprises manufacturières et nous nous sommes concentrés sur elles. Mais il ya différentes entreprises qui sont différentes des entreprises d'électronique. À l'avenir, en recueillant des questionnaires auprès d'autres entreprises manufacturières, nous aimerions comparer les entreprises japonaises.

Enfin, nous avons fait des modèles et des questionnaires proposés à partir de théories conventionnelles. Dans les recherches sur l'open innovation, seuls quelques ouvrages font référence à la coopération en entreprise ou à la qualité des produits de nouveaux produits et les recherches quantitatives sont encore peu nombreuses. Il est nécessaire d'affiner notre modèle ou questionnaires avec cette recherche.

TRANSLATED VERSION: GERMAN

Below is a rough translation of the insights presented above. This was done to give a general understanding of the ideas presented in the paper. Please excuse any grammatical mistakes and do not hold the original authors responsible for these mistakes.

ÜBERSETZTE VERSION: DEUTSCH

Hier ist eine ungefähre Übersetzung der oben vorgestellten Ideen. Dies wurde getan, um ein allgemeines Verständnis der in dem Dokument vorgestellten Ideen zu vermitteln. Bitte entschuldigen Sie alle grammatikalischen Fehler und machen Sie die ursprünglichen Autoren nicht für diese Fehler verantwortlich.

EINLEITUNG

Japanische Fertigungsfirmen haben technische Fähigkeiten im neuen Produktentwicklungsprozess genutzt und Wettbewerbsvorteile gegenüber ausländischen Unternehmen aufgebaut [26]. In den letzten Jahren bestand jedoch die Bedingung, dass ihre Fähigkeiten nicht zur Herstellung neuer Produkte beitragen. Es ist erforderlich, neue Möglichkeiten im neuen Produktentwicklungsprozess zu finden und zu nutzen.

Um die technologischen Fähigkeiten zu ergänzen, neigen verschiedene Unternehmen dazu, offene Innovationen einzuführen. Insbesondere in den Bereichen des Hightech-Verarbeitenden Gewerbes ist offene Innovation weiter verbreitet [6]. In den späten Jahren wird das Konzept der offenen Innovation von der Industrie und Wissenschaftlern beachtet. Dieses Konzept bedeutet, dass Unternehmen Ressourcen außerhalb ihrer F&E für ihre F&E über ihre Grenzen hinaus nutzen [2]. Hinter diesem Hintergrund steht die Tatsache, dass Unternehmen mehr Möglichkeiten haben, Ressourcen außerhalb zu nutzen. Frühere Studien deuten darauf hin, dass Unternehmen durch die Nutzung von Ressourcen außerhalb des F&E-Prozesses effizienter gestalten oder neue Produkte schaffen könnten [3, 28].

Obwohl das Konzept der offenen Innovation Aufmerksamkeit erregt, haben japanische Unternehmen einen starken Trend, ihre technologischen Fähigkeiten zu verbessern oder neue Produkte nur selbst herzustellen [17]. Dieser Trend ist wie das "Not Invented Here"-Syndrom [19], das eine negative Einstellung zu Wissen ist, das von anderen außerhalb stammt [20]. Aus diesem Grund erwähnten einige Forscher, dass japanische Unternehmen von ihren eigenen Ressourcen abhängig waren und sie nicht dazu neigen, offene Innovationen einzuführen.

Obwohl es negative Meinungen über den japanischen Stil gibt, sollten sie, wenn sie über reichlich interne Ressourcen verfügten, mehr interne Ressourcen als Ressourcen außerhalb mit innerbetrieblicher Zusammenarbeit verwenden. Einige japanische Fertigungsbetriebe haben verschiedene Abteilungen im eigenen Haus, und es könnte reichlich Möglichkeiten geben, verschiedene Ressourcen mit betrieblicher Zusammenarbeit zu nutzen [25]. Heute vergleichen nur wenige Forscher die Wirksamkeit offener Innovation mit der der betrieblichen Zusammenarbeit. Daher halten wir es für notwendig, die Bedeutung offener Innovation in japanischen Fertigungsunternehmen durch einen Vergleich mit der betrieblichen Zusammenarbeit zu klären. Um dies zu verdeutlichen, konzentrieren wir uns auch auf die Produktqualität im Kontext offener Innovation, da es notwendig ist, die Leistung offener Innovation oder der betrieblichen Zusammenarbeit zu beurteilen. Basierend auf einigen Faktoren der offenen Innovation oder der betrieblichen Zusammenarbeit setzen wir die Hypothesen und schlagen ein Modell vor.

Um unsere Hypothesen zu überprüfen, analysieren wir die Beziehungen zwischen Produktqualität, Ressourcennutzung außerhalb und unternehmenseigener Zusammenarbeit auf Basis der Kovarianzstrukturanalyse quantitativ. Diese Analyse basiert auf einer Fragebogenumfrage bei japanischen Elektronikfirmen im Juli 2015.

Unser Papier ist wie folgt aufgebaut: Zunächst präsentieren wir einen Literaturüberblick über offene Innovation, Kreativität der Mitglieder, unternehmenseigene Zusammenarbeit und Produktqualität. Als nächstes setzen wir unsere Hypothesen und erläutern das vorgeschlagene Modell. Anschließend zeigen wir die Ergebnisse unserer Umfrage und Kovarianzstrukturanalyse. Schließlich befassen wir uns mit unserer Schlussfolgerung und der zukünftigen Forschung.

SCHLUSSFOLGERUNG

Durch unsere Analyse wurden unsere Hypothesen überprüft. Wie im Prozess der Hypothesenerstellung diskutiert, scheint die betriebliche Zusammenarbeit effektiver zu sein als die Zusammenarbeit mit anderen externen Unternehmen in japanischen Groß- oder Mittelbetrieben. Solche Unternehmen können über viele verschiedene Ressourcen und Kenntnisse in ihren eigenen Unternehmen verfügen. Durch den Austausch mit Mitgliedern in anderen Abteilungen oder Abteilungen können Mitglieder neue Ideen erhalten und solche Ideen nutzen, um neue Produkte herzustellen.

In dieser Analyse scheinen japanische Elektronikfirmen die betriebliche Zusammenarbeit effektiver zu nutzen als die Zusammenarbeit mit anderen externen Unternehmen. Darüber hinaus fördern japanische Elektronikfirmen durch eine solche Zusammenarbeit die Kreativität ihrer Mitglieder, die in ihren neuen

Produktentwicklungsprozess einbeziehen und neue Produkte herstellen, die in ihrem Markt einzigartig sind. Dieses Ergebnis impliziert, dass japanische Großunternehmen viele potenzielle Möglichkeiten haben, Ressourcen in ihren eigenen Unternehmen zu nutzen, weil sie über mehrere verschiedene Abteilungen und unterschiedliche Ressourcen oder Kenntnisse verfügen.

Wir haben in Zukunft einige Aufgaben zu erforschen. Zunächst müssen wir über Beziehungen unter anderem Produktqualität, offene Innovation und unternehmenseigene Zusammenarbeit recherchieren. In diesem Beitrag konzentrieren wir uns auf einen Teil der Definition von Produktqualität. Obwohl wir Beziehungen zwischen den Konstrukten "die Einzigartigkeit neuer Produkte", "offene Innovation" und "unternehmenseigene Zusammenarbeit" offenbarten, konnten wir die anderen Beziehungen nicht lösen.

Zweitens haben wir uns bei dieser Arbeit nur für Elektronikfirmen in Japan entschieden. Unserer Meinung nach sind solche Unternehmen repräsentatives Beispiel in fertigungsverarbeitenden Betrieben, und wir haben uns auf sie konzentriert. Aber es gibt verschiedene Firmen, die sich von Elektronikfirmen unterscheiden. In Zukunft möchten wir durch das Sammeln von Fragebögen anderer Fertigungsunternehmen japanische Firmen vergleichen.

Schließlich haben wir Modellvorschläge und Fragebögen aus konventionellen Theorien gemacht. In den Forschungen von Open Innovation beziehen sich nur wenige Arbeiten auf die betriebliche Zusammenarbeit oder die Produktqualität neuer Produkte und quantitative Forschungen sind noch wenige. Es ist erforderlich, unser Modell oder Fragebögen mit dieser Forschung zu verfeinern.

TRANSLATED VERSION: PORTUGUESE

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VERSÃO TRADUZIDA: PORTUGUÊS

Aqui está uma tradução aproximada das ideias acima apresentadas. Isto foi feito para dar uma compreensão geral das ideias apresentadas no documento. Por favor, desculpe todos os erros gramaticais e não responsacule os autores originais responsáveis por estes erros.

INTRODUÇÃO

As empresas de manufatura japonesas utilizaram capacidades técnicas no novo processo de desenvolvimento de produtos, e construíram vantagens competitivas contra empresas estrangeiras [26]. No entanto, nos últimos anos, há uma condição de que suas capacidades não contribuam para a minação de novos produtos. É necessário encontrar e usar novas oportunidades no novo processo de desenvolvimento de produtos.

Para complementar as capacidades tecnológicas, várias empresas tendem a adotar a inovação aberta. Particularmente nos setores manufatureiro de alta tecnologia, a inovação aberta é mais amplamente adotada [6]. Nos últimos anos, o conceito de inovação aberta recebe atenção da indústria e acadêmicos. Esse conceito significa que as empresas utilizam recursos fora para sua P&D além de seus limites [2]. Por trás desse contexto está o fato de que as empresas têm mais oportunidades de utilizar recursos fora. Estudos anteriores indicam que, utilizando recursos externos, as empresas poderiam tornar o processo de P&D mais eficiente ou criar novos produtos [3, 28].

Embora o conceito de inovação aberta receba atenção, as empresas japonesas têm uma forte tendência de melhorar suas capacidades tecnológicas ou fazer novos produtos apenas por si mesmas [17]. Essa tendência é como a síndrome de "Não Inventou Aqui" [19] que é uma atitude negativa ao conhecimento que se originou de outros de fora [20]. Por essa razão, alguns pesquisadores mencionaram que as empresas japonesas dependiam de seus próprios recursos e não tendem a adotar a inovação aberta.

Embora existam opiniões negativas sobre o estilo japonês, se eles tinham recursos internos abundantes, eles deveriam usar mais recursos internos do que recursos fora com a cooperação interna. Algumas empresas de manufatura japonesas têm diferentes departamentos internamente e pode haver oportunidades abundantes para utilizar diferentes recursos com cooperação in-company [25]. Agora, poucos pesquisadores comparam a eficácia da inovação aberta com a da cooperação in company. Por isso, consideramos necessário esclarecer a importância da inovação aberta nas empresas manufatureira japonesas através da comparação com a cooperação in company. Para esclarecê-lo, também focamos na qualidade do produto no contexto da inovação aberta, pois é necessário julgar a atuação da inovação aberta ou da cooperação in company. Com base em alguns fatores sobre inovação aberta ou cooperação in company, estabelecemos as hipóteses e propomos um modelo.

Para verificar nossas hipóteses, analisamos quantitativamente as relações entre a qualidade do produto, a utilização de recursos fora e a cooperação in company com base na Análise da Estrutura de Covariância. Esta análise é baseada em uma pesquisa de questionário em empresas japonesas de eletrônicos em julho de 2015.

Nosso trabalho está estruturado da seguinte forma: primeiro, apresentamos uma revisão biblio literatura sobre inovação aberta, criatividade dos membros, cooperação in company e qualidade do produto. Em seguida, estabelecemos nossas hipóteses e explicamos o modelo proposto. Em seguida, mostramos os resultados da nossa pesquisa e da Análise da Estrutura de Covariância. Finalmente, abordamos nossa conclusão e pesquisas futuras.

CONCLUSÃO

Através de nossa análise, nossas hipóteses foram verificadas. Como discutido no processo de criação de hipóteses, a cooperação in-empresa parece ser mais eficaz do que a cooperação com outras empresas de fora em grandes ou médias empresas japonesas. Tais empresas podem ter muitos recursos e conhecimentos diferentes em suas próprias empresas. Através do compartilhamento com membros em outras divisões ou departamentos, os membros podem obter novas ideias e utilizar tais ideias para fazer novos produtos.

Nesta análise, as empresas japonesas de eletrônicos parecem utilizar a cooperação in-company de forma mais eficaz do que a cooperação com outros fora. Além disso, usando essa cooperação, as empresas japonesas de eletrônicos aumentam a criatividade de seus membros que envolvem em seu novo processo de desenvolvimento de produtos e produzem novos produtos que são únicos em seu mercado. Esse resultado implica que as grandes empresas japonesas têm muitas oportunidades potenciais de usar recursos em suas próprias empresas porque têm vários departamentos diferentes e diferentes recursos ou conhecimento.

Temos algumas tarefas para pesquisar no futuro. Em primeiro lugar, temos que pesquisar sobre relações entre outras qualidades de produtos, inovação aberta e cooperação in company. Neste artigo, focamos em uma parte da definição de qualidade do produto. Embora tenhamos revelado relações entre os construtos "a singularidade de novos produtos", "inovação aberta" e "cooperação in company", não conseguimos resolver as outras relações.

Em segundo lugar, escolhemos apenas empresas de eletrônicos no Japão neste trabalho. Em nossa opinião, essas empresas são exemplos representativos nas empresas de manufatura e focamos nelas. Mas há várias empresas que são diferentes das empresas de eletrônicos. No futuro, coletando questionários de outras empresas de manufatura, gostaríamos de comparar empresas japonesas.

Por fim, fizemos modelos e questionários propostos a partir de teorias convencionais. Nas pesquisas de Inovação Aberta, apenas poucos trabalhos referem-se à cooperação in company ou qualidade do produto de novos produtos e pesquisas quantitativas ainda são poucos. É necessário refinar nosso modelo ou questionários com esta pesquisa.