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Analysis of management accounting information on competitive advantage in servitized manufacturing firms with decision making effectiveness and innovation by mediation

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Abstract

This study aims to test and analyze the effect of MAI on CA in servitized manufacturing firms, MAI on DME, DME on CA, and the effect of MAI on CA by DME mediation, the effect of MAI on IN, IN on CA, and the effect of MAI on CA by IN mediation. The research method uses a quantitative approach with a convenience sampling. The primary research data was collected through questionnaires obtained from a total sample of 82 manufacturing companies in the Surabaya Industrial Estate Rungkut (SIER) area, Surabaya, East Java. The research used data analysis techniques in the form of descriptive statistical analysis and statistical analysis through PLS-SEM on WarpPLS 7.0. The results of the study concluded that (1) MAI on CA; (2) MAI on DME; (3) DME on CA; (4) DME mediates MAI on CA; (5) MAI on IN; (6) IN on CA; and (7) IN mediates MAI on CA, all result has a significant positive effect. This research contributes to parallel research and contributes to contingency theory. In addition, this research has implications for manufacturing companies to be able to optimize management accounting information in an effort to be able to competitively which can improve business performance compared to its competitors.

Keywords: Sertivitation; management accounting information; decission making effectiveness; innovation; competitive advantage

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INTRODUCTION

Business competition has given rise to various conditions, pressure, risk, make a new innovation and uncertain. The purpose of the organization is to respond to all opportunities and threats in the right business area to achieve the goal. In addition, companies are required to carry out competency development in accordance with future or long-term plans, where the plan is a practical draft of the various information available today plus future projections. This competence is where competitors cannot easily duplicate products produced by a company in order to achieve competitive advantage (Scoemaker, 1992).

Competitive advantage of a company in the short term can be obtained through low cost strategies and product differentiation. But in the long term, competitive advantage can only be obtained by building competence, carrying out various kinds of innovations and moving faster than its competitors. Sources of competitive advantage can be seen from the ability of top managers to consolidate information which includes cost, marketing and product information, where this can effectively support the achievement of the company's strategic goals and play a role in achieving competitive advantage.

Manufacturing companies in Indonesia currently do not have a competitive advantage compared to other countries (Neely, 2008) which shows that only 15.29% of manufacturing companies fall into the servitation category, where servitization is a reflection of competitive advantage. This figure is considered lower than neighboring countries such as Singapore, Malaysia and Thailand, where servitization is a shift in business patterns that used to only focus on product centric to focus on service centric, this stems from a lack of good management of company information that can be used to read opportunities, set strategies, create innovations, in order to be ahead of its competitors.

East Java Province is a reflection of how far Indonesia has excelled from economic competitiveness for two decades (Oxford Business Group 2014; World Bank 2011; Bowring 2015) in Mustaghfirin (2018). The results of this data are also supported by the economic competitive index of 33 provinces made by the Asia Competitiveness Institute (ACI), showing that East Java province ranks second consistently under DKI Jakarta. This shows that East Java is very competitive down to the district and city level, where there is very fast economic growth, one of which is from the transition of the economic sector from manufacturing to the service sector, where Surabaya which is the capital city of East Java has an Industrial Area whose shares are owned by BUMN and the East Java Provincial Government, namely SIER (Surabaya Industrial Estate Rungkut) as well as being an industrial area with the largest land area when compared to other BUMN industrial areas, namely an area of 916 ha (compared to the Nusantara Bonded Zone (KBN) of 620 ha, Jakarta Industrial Estate Pulogadung (JIEP) covering an area of 433 ha, Medan Industrial Area (KIM) covering an area of 666 ha, Wijayakusuma Industrial Area (KIW) covering an area of 250 ha and Makassar Industrial Area (KIMa) covering an area of 348 ha), so that Surabaya is considered appropriate to be a representative of servitization in Indonesia.

Especially during the Covid-19 pandemic, it became a transformation process that forced manufacturing companies to have logic, not only focusing on dominant product logic, but dominant service logic and being increasingly forced to be able to connect customers with their business products. For example, selling car products during the Covid-19 pandemic (a trend started by Tesla) allows customers to be able to buy cars online, where now there is not only after-service, but allows pre-service for co-creation. As a result, new technologies such as virtual reality are used for interactive visualization to provide a customer experience before buying a car, which is at the product design stage, where up to the business innovation stage there is a very long and in-depth processing of management information.

In some of the existing literature, it is found that servitized manufacturing companies still rely heavily on traditional costing techniques for pricing decisions, such as additional cost and price-based pricing by sellers or their marketing (Tenucci & Cinquini, 2015; Tenucci & Laine, 2016). They argue that these companies should increase the availability of management accounting information for their service products, as an effort to increase decision making effectiveness, innovation and future business forecasting. Therefore, they show that it is important to obtain sufficient information from appropriate management accounting methods on servitization in manufacturing companies in order to achieve competitive advantage. Servitization will make the information chain even longer, all cost information must be available, from small information to disposal items or items that are no longer used.

Researchers see that there are still not many research models that examine the relationship between management accounting information and competitive advantage, so researchers are interested in conducting this research. This study also tries to identify the limitations of previous research, by adding a larger sample size, describing a different conceptual framework and adding research variables that have not been investigated by previous researchers in Indonesia, as well as research being researched by (Purwohedi et al., 2022) in manufacturing companies located in the Nusantara Bonded Zone (KBN) and Jakarta Industrial Estate Pulogadung (JIEP) so this research will provide empirical findings that are different from previous research, supported by mediation testing of the decision-making effectiveness and innovation which is still small, also by creating a mediation model which is also still small, makes the researcher decide to conduct further research.

METHOD

Units of analysis or can be referred to as elements, namely population-forming units in the form of individuals, groups, companies, etc. (Purwohedi, 2022). Where in this study are manufacturing companies located in the Surabaya Industrial Estate Rungkut (SIER) area. Meanwhile, the population is all data available for research (Purwohedi, 2022), where the population will be based on companies in the manufacturing sector. Researchers will conduct convenience sampling, where researchers will distribute questionnaires to factory heads/financial managers/operations managers/marketing managers/ who can represent them, because these positions have a broader view of how companies use accounting information and its relationship to competitive advantage (Tenucci & Another, 2016). Researchers will distribute questionnaires directly, send questionnaire links via e-mail, document forwarding services and distribute Google form links via WhatsApp messages with email addresses from the information provided by PT. Surabaya Industrial Estate Rungkut (SIER).

Based on data obtained from the SIER Investor Register Book, there are 452 companies in the industrial area, which includes the Surabaya Industrial Estate Berbek (SIEB) and Pasuruan Industrial Estate Rungkut (PIER) areas. The Indonesia Stock Exchange (IDX) classifies listed companies into three main categories: raw material producers, manufactures and services. Each category contains a number of sectors where raw materials consist of two agricultural sectors and a mining sector. The manufacturing category consists of three sectors: basic and chemical industries, various industries and the consumer goods sector. Finally, the services category consists of four sectors: property, real estate and building construction, infrastructure, utilities and construction, finance, trade and services and investment. In total, there are nine industrial sectors on the IDX. For the purpose of this study, researchers will focus on the manufacturing category which consists of three sectors. Furthermore, the researcher will ensure that the participating companies have been servitized.

In addition, the sample size used in this study uses the Krejcie and Morgan (1970) table, where it is easier to determine the number of samples, which is then corroborated by Chuan (2006), where the sample table can increase the Cohen effect size, which means that the number of samples it is suggested that certain population levels have a practical contribution in predicting a phenomenon (Purwohedi, 2022), Krejcie and Morgan (1970) with the following formula:

$$\boldsymbol{s = \frac{X^2.N.P\ (1-P)}{(N-1).d^2 + X^2.P\ (1-P)}}$$

The number of samples based on the results of using the Krejcie and Morgan formula is known to be 188.96, then the researchers rounded up the sample calculation results to 189 so that the results of their research would be better. However, due to the limitations of the study, the researchers used a sample of 82 as a consequence of convenience sampling on the willingness of respondents to participate in filling out a questionnaire survey, which was taken from the category of 371 manufacturing companies which were divided into three sectors, namely basic and chemical industries, various industries and sectors consumer goods.

Table 1.
Table Based on Category Manufacture

Category Manufacture	Amount
Sector industry basics and chemistry	34
Sector various industries	293
Sector goods consumption	44
Total	371

Technique Collection Data

The data collection technique used in the preparation of this thesis is by using primary data in the form of questionnaire results obtained from tenants/investors in the Surabaya Industrial Estate Rungkut (SIER) area, where the data obtained is obtained directly from the source, namely through a questionnaire technique.

The questionnaire in this study consists of two structures. The first structure of the questionnaire consists of the personal information of the respondent. The second structure consists of questions that have a relationship with the variables in the study. Then the questionnaire will be distributed to respondents to be filled out via the Google form.

Where in measuring this indicator, researchers used a Likert scale with point levels, namely 1 – 7. According to Sugiyono (2013), the Likert scale starts from the most negative level, neutral level, to a positive level.

Operationalization of Research Variables

Dependent Variable

A company is said to have a competitive advantage when it can enjoy greater success today or compared to competitors in its industry, this shows that superior company performance serves as an indicator of competitive advantage (Barnett, Greve, and Park, 1994; Ghemawat and Rivkin, 1999 in Schilke, 2014). Specifically, researchers operationalize competition into two dimensions, first from strategic performance and secondly from financial performance where information is obtained from net operating income before taxes and interest (EBIT), return on investment (ROI) and return on sales (ROS), then standardize the information. In measuring these indicators, the researchers used a Likert scale.

Independent Variable

Management accounting information is measured based on two main aspects, namely planning and control, and non-financial performance. In measuring these indicators, the researchers used a Likert scale.

Six items of planning and control indicators (seven-point Likert scale) are as follows:
(1) Standard Costing (costs determined at the outset to make a product), (2) Budgeting, (3) Direct Costing and variable costs (Costs directly related to the product produced) (4) Activity-Based Costing (Factory overhead cost allocation system based on activity), (5) Life-cycle costing (Costs that arise from the design stage until the product cannot be used, for example warranty guarantees), (6) Long-range cost trend long-term),

The thirteen non-financial performance information (seven-point Likert scale) are as follows:
(1) On-time delivery, (2) Customer complaints, (3) Product returns, (4) Product defects (defects), (5) Customer satisfaction, (6) Product quality, (7) New products, (8) Ability to add variety of products, (9) Length-of cycle time (time needed to make a product), (10) Material scrap-loss (residual material from making products, (11) Machine utilization, (12) Collaboration of production employees, (13) Production setup

Mediation Variables

The decision-making effectiveness of is measured formatively in terms of whether the company is more effective than its competitors in understanding customers, making decisions in real time and responding more quickly to changes (Cao et al., 2015), while innovation is measured by indicators of exploratory innovation and exploitative innovation. Exploitative is a process of expanding current knowledge such as efficiency or improvement, in other words, incremental innovation. While exploratory innovation is the activity of developing new knowledge and conducting experiments to be able to create new variations of a product or service so that it can encourage radical innovation (Gima, 2005).

RESULTS AND DISCUSSION

Data Description

The description of the data in this study describes the profile of the respondent and the data profile. The data of this study amounted to 82 samples. The respondent's profile contains the respondent's personal information as measured by the results showing the percentage. The data profile contains descriptive analysis that describes the characteristics and frequency of respondents' answers regarding statements from management accounting information, decision-making effectiveness, innovation and competitive advantage.

The number of samples based on the results of using the slovin formula is known to be 81.88, then the researchers rounded up the results of the sample calculation to 82 so that the results of their research will be better. In addition, based on the sampling technique using convenience sampling, the research was carried out by distributing questionnaires directly, sending questionnaire links via e-mail, document expedition services and distributing Google form links via WhatsApp messages with email addresses from the information provided by PT. Surabaya Industrial Estate Rungkut (SIER) through the Investor List Book, link google form questionnaire was also distributed when there was a gathering between area managers (PT. SIER) and tenants/investors.

The number of manufacturing companies in this study were 82 respondents, which were dominated by the various industrial sector categories with a total of 63 manufacturing companies or 77%, which is a much larger number than the basic and chemical industry sector category with 13 manufacturing companies or 16% and the consumer goods category. 6 manufacturing companies or 7%, in which all sectors of the manufacturing category have carried out servitization.

In this study, it shows that the most servitization is found in the type of providing additional services for goods purchased by customers by 34%, the type of having other business units engaged in services with the aim that products can reach consumers by 36%, the type that sells goods and supporting services in one package with products sold by 23%, types of producing goods while renting them out and more oriented to selling the benefits of goods produced through leasing of goods produced by 5% and types of offering services that can replace the benefits of a particular product by 2 %, besides that there are 43 companies or 52% only have one type of servitization, while 39 companies or 48% have more than one type of servitization, this shows that Surabaya has changed its business pattern which used to focus only on centric products to focus on to service centric, this is driven by good management of company information that can be used to read opportunities, set strategies, create innovations, in order to be ahead of its competitors.

So that East Java Province can continue to be a reflection in Indonesia, how far it is superior in terms of economic competitiveness, and shows that East Java is very competitive where there is very fast economic growth, one of which is from the transition of the economic sector from manufacturing to the service sector.

Based on the respondent profile table, it can be seen that the positions that answered the most questionnaires were in staff/supervisor/secretary/HRD positions, namely 48 respondents or 59%, while for manager/head of production/GM positions there were 30 respondents or 37%, this was because in this position have a broader view of how companies use accounting information and its relationship to competitive advantage (Tenucci & Lain, 2016), and there were 4 respondents or 5% who were answered directly by the company's leadership.

Based on the table of respondent profiles, it can be seen that the 82 respondents studied were dominated by men as many as 64 respondents or 78% which is far greater than the number of female respondents as much as 18 or 22%, which shows the dominance of men in the manufacturing industry.

Based on the respondent profile table it can also be seen that ages 31-40 years dominate as many as 28 respondents or 34%, slightly different by 1 respondent or 1% lower for respondents aged 41-50 years which are 27 respondents or 33%, for respondents aged above or 51 years as many as 18 respondents or 22% while in the range of 21-30 years there are 9 respondents or 11%, this illustrates the capability of knowing company information in that age range.

Based on the respondent profile table it can also be seen that the last education level is S1 as many as 60 respondents or 73% which is the most dominating, this indicates that the quality of the respondents is good in understanding the company, which is a minimum qualification that must at least be fulfilled,

compared to the level of education the last SMA/SMK were 15 respondents or 18%, the last D3 level of education was 6 respondents or 7% and the last S2 level was 1 respondent or 1%.

Based on the respondent profile table it can also be seen that the length of time working in the company is also considered important to observe which can describe the ability to capture existing information in the respondent's company. 11-20 years there are 26 respondents or 32%, and the working range of more than 21 years is 15 respondents or 18%.

Data Profile

The data profile in this study is to determine the characteristics of the data on respondents' answers to statements from management accounting information, decision-making effectiveness, innovation and competitive advantage. The data profile of this study uses descriptive analysis to present the frequency, minimum value, maximum value, average value, and standard deviation. The following table and explanation of descriptive analysis in this study.

Table 2.
Analysis Descriptive

Variable	N	Minimum	Maximum	Means	STDEV
Management Accounting Information	82	1	7	4.86	1.68
Decision Making Effectiveness	82	1	7	5.59	1.42
Innovation	82	1	7	4.72	1.42
Competitive Advantage	82	1	7	5,6	1.23

In the descriptive analysis measurement in table 2 it is known that the profile of the respondent's data on the statements of each variable obtained a sample of 82 samples.

Management Accounting Information (MAI)

Management accounting information as a mediating variable has 19 statement items with a minimum number of answers of 1 score and a maximum number of answers of 7 scores. The average value (mean) in the statement of competitive advantage obtained answers from respondents of 4.86 which means that in this study the head of the factory/financial manager/operations manager/marketing manager/ who could represent as a respondent agreed that management accounting information has an influence on competitive advantage in manufacturing companies. In addition, the results of the standard deviation value for management accounting information obtained a value of 1.68, which means that the data in this study has a less varied range of values because it has a small distance between the magnitude of each data and the average value (mean).

Decision Making Effectiveness (DME)

The effectiveness of decision making as a mediating variable has 3 statement items with a minimum number of answers of 1 score and a maximum number of answers of 7 scores. The average value (mean) in the statement of the effectiveness of decision-making obtained answers from respondents of 5.59 which means that in this study the head of the factory/financial manager/operational manager/marketing manager/who could represent as a respondent agreed that the effectiveness of decision-making decisions have an influence on competitive advantage in manufacturing companies. In addition, the results of the standard deviation value on the effectiveness of decision making obtain a value of 1.42, which means that the data in this study has a range of values that are less varied because it has a small distance between the magnitude of each data and the average value (mean).

Innovation (IN)

Innovation as a mediating variable has 8 statement items with a minimum number of answers of 1 score and a maximum number of answers of 7 scores. The average value (mean) in the statement of competitive advantage obtained answers from respondents of 5.6 which means that in this study the head of the factory/financial manager/operations manager/marketing manager/ who can represent as a respondent agreed that innovation has an impact to competitive advantage in manufacturing companies. In addition, the results of the standard deviation value for innovation obtained a value of 1.23, which means that the data in this study has a less varied range of values because it has a small distance between the magnitude of each data and the calculated average value (mean).

Competitive Advantage (CA)

Competitive advantage as a mediating variable has 6 statement items with a minimum number of answers of 1 score and a maximum number of answers of 7 scores. The average value (mean) in the statement of competitive advantage obtained answers from respondents of 4.72 which means that in this study the head of the factory/financial manager/operations manager/marketing manager/ who can represent as a respondent stated that he agreed that competitive advantage being able to manage management accounting information and the effectiveness of decision making and innovation have an influence on competitive advantage in manufacturing companies. In addition, the results of the standard deviation value for competitive advantage obtained a value of 1.42, which means that the data in this study has a less varied range of values because it has a small distance between the magnitude of each data and the average value (mean).

Evaluation of Measurement Model (Outer Model)

Here is a research model in the form of a path diagram .

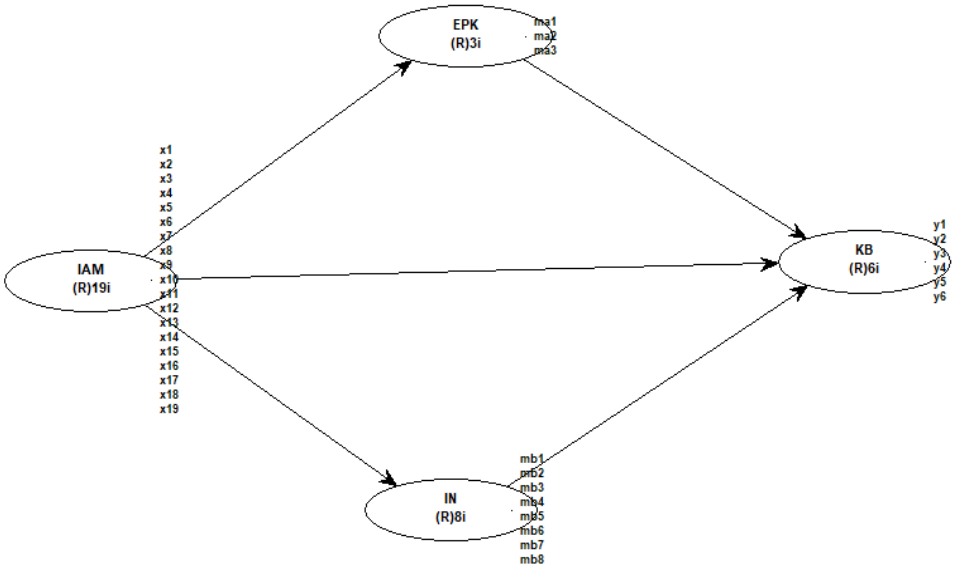

Table 3.
Path Diagrams

Path Diagram is interpreted as a single diagram consisting of a combination of measurement models and structural models. The path diagram in this study connects between variables, where MAI as an independent variable is also considered as an exogenous variable, CA as the dependent variable is also considered as an endogenous variable, and DME and IN are mediating variables. In the path diagram there is a single arrow which means that there is a causal relationship between exogenous and endogenous variables. According to Hair et al (2016) to get results on the outer model, various tests must be carried out, including:

Convergent Validity

Convergent validity is defined as a positive correlation measure through alternative measures of the same construct. Therefore, the indicator items for each variable must reach a valid construct. To find out which constructs are valid, a convergent validity evaluation is carried out by considering the outer loadings and Average Variance Extracted (AVE) values. The following is the value of outer loadings from the management accounting information construct, decision-making effectiveness, innovation and competitive advantage.

Table 3.
Outer Loadings

	Management ccountanting Information	Decision Making Effectiveness	Innovation	Competitive Advantage	Information
IAM1	0.467				Drops
IAM2	0.656				Valid
IAM3	0.774				Valid
IAM4	0.813				Valid
IAM5	0.785				Valid
IAM6	0.801				Valid
IAM7	0.623				Valid
IAM8	0.639				Valid
IAM9	0.666				Valid
IAM10	0.614				Valid
IAM11	0.747				Valid
IAM12	0.713				Valid
IAM13	0.639				Valid
IAM14	0.753				Valid
IAM15	0.816				Valid
IAM16	0.756				Valid
IAM17	0.804				Valid
IAM18	0.760				Valid
IAM19	0.840				Valid
EPK1		0.857			Valid
EPK2		0.871			Valid
EPK3		0.908			Valid
IN1			0.529		Valid
IN2			0.749		Valid
IN3			0.816		Valid
IN4			0.768		Valid
IN5			0.856		Valid
IN6			0.857		Valid
IN7			0.794		Valid
IN8			0.836		Valid
KB1				0.613	Valid
KB2				0.770	Valid
KB3				0.764	Valid
KB4				0.862	Valid
KB5				0.922	Valid
KB6				0.883	Valid

The results of the outer loadings test on the exogenous construct in this study are IAM where there are 19 statements having an outer loadings value ≥ 0.5 meaning that the statement items are valid and can be used for further testing. However, there is 1 statement of management accounting information (IAM1) that has an outer loading value of <0.5, meaning that the statement item is invalid (dropped) and cannot be used for further testing. Furthermore, the endogenous construct test results in this study, namely competitive advantage consisting of 6 statement items, have an outer loadings value of ≥ 0.5, meaning that the 6 statement items are valid and can be used for further testing. Finally, the results of the outer loadings test on decision-making effectiveness have 3 statement items that have an outer loadings value ≥ 0.5, meaning that all of these statement items are valid and can be used for further testing, as well as the outer loadings test results on innovation have 3 statement items that have an outer value loadings ≥ 0.5 means that all the statement items are valid and can be used for further testing.

After evaluating the value of outer loadings, the next step is to consider the value of Average Variance Extracted (AVE). If the AVE value > 0.5 then the AVE value can be said to be valid. The following is the AVE value of each variable in this study.

Table 4.
Average Variance Extracted (AVE)

Variable	Average Variance Extracted
Management Accounting Information	0.544
Decision Making Effectiveness	0.772
Innovation	0.612
Competitive Advantage	0.654

Based on the AVE test results table, it can be seen that all indicators in measuring each variable in this study have a value of > 0.5, which means that the value is acceptable or valid.

Discriminant Validity

Discriminant validity is defined as a construct that is considered unique because it is different from other constructs from empirical standards. In evaluating discriminant validity, it is necessary to test cross loadings and the Fornell Larcker criterion. For the Fornell Larcker criterion itself is interpreted as a measure by comparing the square root of the AVE value which is related to the latent variable. Based on this, the square root value of each AVE construct must be greater than the correlation value with other constructs. The following is the Fornell Larcker value of the management accounting information construct, decision-making effectiveness, innovation and competitive advantage.

Table 5.
Fornell Larcker Criterion

	Management Accounting Information	Decission Making Effectiveness	Innovation	Competitive Advantage
Management Accounting Information	0.738			
Decission Making Effectiveness	0.694	0.879		
Innovation	0.725	0.772	0.782	
Competitive Advantage	0.677	0.655	0.691	0.809

Based on the results of the Fornell Larcker criterion test, it can be seen that the square root AVE value on decision-making effectiveness performance is 0.879 which indicates that this value is greater than the management accounting information correlation value of 0.694, which means that the value of discriminant validity is acceptable. In addition, the AVE square root value for innovation is 0.782 which indicates that this value is greater than the correlation value of decision-making effectiveness of 0.772 and also the AVE square root value for innovation is greater than the management accounting information correlation value of 0.725. This shows that the value of discriminant validity is acceptable. Finally, the AVE square root value for competitive advantage is 0.809 which indicates that this value is greater than the innovation correlation value of 0.691 and also between the AVE square root value for competitive advantage is greater than the decision-making effectiveness correlation value of 0.655 and between the AVE square root value on competitive advantage is greater than the management accounting information correlation value of 0.677. This shows that the value of discriminant validity is also acceptable. After conducting the Fornell Larcker test, the researcher also considered the cross loadings value test. Cross loading is defined as a measurement of outer loadings on related constructs and other constructs, where the value of outer loadings on related constructs must be greater than the value of cross loading on other constructs. The following is the cross loading value of each variable.

Table 6.
Cross Loadings

	Management Accounting Information	Decision Making Effectiveness	Innovation	Competitive Advantage
IAM2	0.633	0.491	0.412	0.434
IAM3	0.630	0.424	0.45	0.47
IAM4	0.668	0.423	0.42	0.445
IAM5	0.705	0.397	0.389	0.44
IAM6	0.680	0.385	0.413	0.468
IAM7	0.765	0.362	0.357	0.396
IAM8	0.634	0.461	0.455	0.423

	Management Accounting Information	Decision Making Effectiveness	Innovation	Competitive Advantage
IAM9	0.581	0.485	0.465	0.459
IAM10	0.636	0.466	0.447	0.423
IAM11	0.561	0.497	0.484	0.452
IAM12	0.604	0.498	0.49	0.383
IAM13	0.652	0.426	0.451	0.435
IAM14	0.614	0.449	0.499	0.415
IAM15	0.651	0.434	0.46	0.42
IAM16	0.673	0.431	0.445	0.403
IAM17	0.596	0.458	0.519	0.406
IAM18	0.617	0.396	0.513	0.445
IAM19	0.605	0.444	0.517	0.412
EPK1	0.409	0.657	0.503	0.385
EPK2	0.471	0.611	0.478	0.421
EPK3	0.432	0.628	0.483	0.431
IN1	0.417	0.517	0.578	0.474
IN2	0.465	0.486	0.615	0.412
IN3	0.442	0.491	0.606	0.443
IN4	0.450	0.420	0.635	0.466
IN5	0.434	0.507	0.63	0.398
IN6	0.438	0.497	0.612	0.432
IN7	0.481	0.422	0.635	0.433
IN8	0.454	0.493	0.626	0.400
KB1	0.36	0.548	0.483	0.58
KB2	0.49	0.451	0.381	0.641
KB3	0.404	0.415	0.473	0.665
KB4	0.467	0.393	0.457	0.647
KB5	0.433	0.396	0.444	0.677
KB6	0.448	0.405	0.46	0.651

Based on the results of the cross loading test, it can be seen that the overall outer loading value of each indicator in the related construct has a greater value than the cross loading value in the other constructs. The following is an explanation regarding the results of the cross loading test.

Thus all existing constructs or all variables in this study have good discriminant validity.

Composite Reliability and Cronbach Alpha

Composite reliability testing to test the accuracy and precision of measurement of all constructs. If the value of composite reliability and Croncbach aplha > 0.7 then the value can be said to be reliable. The following is the composite reliability value and Cronbach alpha value of each variable.

Table 7.
Composite reliability and cronbach alpha

Variable	Composite reliability	cronbach alpha
Management Accounting Information	0.955	0.950
Decission Making Effectiveness	0.910	0.852
Innovation	0.925	0.906
Competitive Advantage	0.918	0.891

Based on the results of the composite reliability and Cronbach alpha tests, it can be seen that all constructs on composite reliability scores and composite reliability scores have a value of more than 0.7, meaning that all variables in this study can be said to be reliable. This is because all the variables in the composite reliability and Cronbach alpha tests have adequate internal consistency in measuring a construct. Therefore, all the constructs in this study were declared reliable and could carry out further analytical testing. Based on the results of testing the evaluation of measurement model (outer model) it can be concluded that this research has adequate and acceptable convergent validity and discriminant validity test results. In addition, the composite reliability and cronbach alpha tests have adequate internal consistency reliability results. Therefore researchers can perform further analysis testing.

Evaluation of Structural Model (Inner Model)

Evaluation of structural model is defined as a measurement model that tests causality between variable constructs. Based on research by Hair et al. (2016), the tests carried out in the evaluation of the structural model are as follows.

Path Coefficients

Path coefficients are interpreted as a model that looks at the direction in which the hypothesis relationship occurs. Path coefficients have standard values that can be smaller or larger but are usually between the standard value limits of -1 to +1. Simply put, if the value gets closer to +1 the relationship is more positive and so is -1 the relationship is getting stronger negative. The following table shows the path coefficients values.

Table 8.
Path coefficients

	Management Accounting Information	Decission Making Effectiveness	Innovation	Competitive Advantage
Management Accounting Information		0.760	0.784	0.357
Decission Making Effectiveness				0.181
Innovation				0.272
Competitive Advantage				

Based on the results of the path coefficients test, it can be seen that each variable in this study has a positive relationship. In testing the management accounting information variable on the effectiveness of decision making, it has a positive effect of 0.760, in testing the management accounting information variable on innovation it also has a positive effect of 0.784, in testing the management accounting information variable on competitive advantage it also has a positive effect of 0.357. Then in testing the variable of decision-making effectiveness on competitive advantage it has a positive effect of 0.181, as well as in testing the innovation variable on competitive advantage it also has a positive effect of 0.272.

P-Value

P-Value is defined as a significant test of the hypothesis, because a hypothesis can be accepted or rejected statistically can be calculated by its level of significance. The significance level used in this study is 5%. If the chosen significance level is 5%, then the significance level or confidence level is 0.05 to reject a hypothesis. In this study there is a 5% probability of making a wrong decision and a 95% probability of making a correct decision, if the p-value ≤ 0.05 then the hypothesis is accepted and if the p-value ≥ 0.05 then the hypothesis is rejected.

Table 9.
P-Value

	Management Accounting Information	Decission Making Effectiveness	Innovation	Competitive Advantage
Management Accounting Information				
Decission Making Effectiveness	< 0.001			
Innovation	< 0.001			
Competitive Advantage	< 0.001	0.043	0.005	

Based on the results of the existing hypothesis testing, it can be seen that the value of each hypothesis in this study, namely H1, H2, H3, H4, H5, H6 and H7 has a value of ≤ 0.05, which means that all hypotheses in this study are accepted. Following is a further explanation of the results of the hypothesis test in table 11.

The effect of management accounting information on competitive advantage

The first hypothesis in this study is the effect of management accounting information on competitive advantage. The first hypothesis in this study formulates that the higher the level of Management Accounting Information (MAI), the higher the level of Competitive Advantage (CA). The results of the research on testing the first hypothesis are accepted. That is because management accounting information has a significant influence on competitive advantage. The results of this study are also in line with previous research conducted by Muthaher, (2009); Jong-min Choe, (2004); Ikhsan

& Rasdianto, (2005); Han & Gao, (2019), showed significant positive results between the effect of management accounting information on competitive advantage, where in pursuit of competitive advantage, they seek to improve information for business by developing various management accounting methods so that they can maintain their relevance during a changing environment with this fast. Among them are the Balanced Scorecard (Kaplan & Norton, 1996; Kaplan & Norton, 2005), target costing (Ansari et al., 2007; Monden & Hamada, 1991), attribution costs (Bromwich & Bhimani, 1994), brand management accounting (Roslender & Hart, 2002), customer accounting and customer profitability analysis (Holm et al., 2016), and environmental management accounting (Dunk, 2007).

The results of this study also support the contingency theory in which management accounting systems are useful in providing information that companies can use for various purposes (Otley, 1980) and to face competition (Mia & Clarke, 1999). Management accounting information is an important element that contributes to continuously improving product quality and increasing competitive advantage. Based on the findings and the theory of conformity, the company owner can intensely manage management accounting information, where management accounting information is how to collect, classify, summarize and report information to managers to assist them in planning, controlling and evaluating production activities (Bruggeman & Slagmulder, 1995), which in the end was able to make the company superior compared to its competitors.

As well as supporting the concept of servitization as reflected in Porter's strategy, where these three strategies form the basis for companies to maintain a competitive advantage in competing in their industry, where the core of sevitization is product differentiation which must be supported by good management accounting information, as well as effective decision making. decisions and innovations.

The influence of management accounting information on the decision making effectiveness

The second hypothesis in this study is the effect of management accounting information on the effectiveness of decision making. The second hypothesis in this study formulates that the higher the level of Management Accounting Information (MAI), the higher the level of Decision Making Effectiveness (DME). The results of the research on testing the second hypothesis are accepted. That is because management accounting information has a significant influence on the effectiveness of decision making.

In several existing studies, researchers who have been involved in the manufacturing industry have devoted their thoughts to finding the right formulation for the success of manufacturing companies. Researchers argue that servitization is a suitable business model in developed economies, as opposed to relying solely on manufacturing models (Lay, 2014).

Effect of decision-making effectiveness on competitive advantage

The third hypothesis in this study is the effect of decision-making effectiveness on competitive advantage. The third hypothesis in this study formulates that the higher the level of decision-making effectiveness (DME), the higher the level of Competitive Advantage (CA). The results of the research on testing the third hypothesis are accepted. That is because the decision making effectiveness has a significant influence on competitive advantage. The results of this study are also in line with previous research conducted by Sambamurthy et al., 2003; Melville et al., 2004; Kohli & Grover, 2008, which suggests that there are factors that might mediate the relationship between information technology related topic proficiency and competitive advantage (eg) while few empirical studies examine relevant mediators and the impact of their interventions (eg Tippins & Sohi, 2003; Ravichandran et al., 2005; Pavlou & El Sawy, 2006). Moreover, other studies on business analytics show that companies that are proficient in capturing and managing data can identify and embed analytical insights into business processes and operations, thereby making data-driven decisions related to competitive advantage (Chen et al., 2015; Davenport, 2013; Kiron et al., 2012; Lavalle et al., 2011) or innovation (Kiron et al., 2014).

The influence of decision-making effectiveness mediates the relationship between management accounting information and competitive advantage

The fourth hypothesis in this study is the effect of decision-making effectiveness mediating the relationship between management accounting information and competitive advantage. The fourth hypothesis in this study formulates that management accounting information and decision-making effectiveness have a positive influence and decision-making effectiveness and competitive advantage have a positive influence, so decision-making effectiveness is possible to mediate the effect of management accounting information on competitive advantage. The results of the research on testing

the fourth hypothesis are accepted. The results of this study are also in line with previous research conducted by Cao et al., (2019)

In terms of sustainable competitive advantage, although management accounting includes ideas on how to develop superior strategies, there is a need for further discussion on how the decision-making process can contribute to achieving a position of competitive advantage (Nielsen et al., 2015). For example, Nielsen et al., (2015) and Saukkonen et al., (2018) study two different decision-making approaches in utilizing management accounting information to gain competitive advantage. This approach is an analytical approach, the first approach reflects centralized decisions where accounting information plays an important role in the decision-making process without the involvement of higher level managers and is decentralized. Whereas, the latter approach emphasizes interaction between participants to cover different managerial viewpoints within the organization (Arbnor & Bjerke, 2008). Based on the results of their research studies, both studies reveal that companies can rely heavily on one approach over the other, or a combination of both to gain competitive advantage. Management accounting information is calculated through systematic modeling for an analytical approach, where relevant and measurable information is assumed to be available by decision makers (Nielsen et al., 2015). On the other hand, Cao et al., (2019) found that information processing ability significantly influences competitive advantage and decision-making effectiveness has mediated the relationship between information processing ability and competitive advantage.

The effect of innovation on competitive advantage

The sixth hypothesis in this study is the effect of innovation on competitive advantage. The sixth hypothesis in this study formulates that the higher the level of Innovation (IN), the higher the level of Competitive Advantage (CA). The results of the research on testing the sixth hypothesis are accepted. This is because innovation has a significant influence on competitive advantage. The results of this study are also in line with previous research conducted by Ferreira et al., (2017), Chatzoglou & Chatzoudes (2018), Kuncoro & Suriani (2017), Afraz et al., (2018) and Hatani (2002), but inversely proportional with those studied by Wang & Zang (2021), Adietya et al., (2015)

Innovation capabilities can help companies find ways to protect and protect the advantages and benefits they have (Lavie, 2006). Successful innovation can make it difficult to imitate external parties or business partners and enable companies to maintain their competitive advantage for the better (Morales et al., 2007). Therefore, innovation can affect competitive advantage and company performance (Wingwon, 2012).

The results of research by Ferreira et al., (2017), show that there is a relationship between Exploration and Exploitation on managerial capabilities where there are positive results between Exploration on managerial capabilities, but different results are found on Exploitation on managerial capabilities. On the other hand, still in the same research, the ability to innovate does not have a significant impact on competitive advantage, where these results are not in line with research conducted by Ferreira, et al., (2017), considering the ability to innovate as a company's special asset. However, this is different from the results of research conducted by Chatzoglou & Chatzoudes (2017) where innovation affects competitive advantage, in accordance with what was hypothesized by Kamboj & Rahman (2017) where both technical innovation and non-technical innovation were found to have an effect on the company's competitive advantage.

Influence innovation to competitive advantage

Hypothesis sixth in study This is influence innovation to competitive advantage. hypothesis sixth on research This formulate that the more level Innovation (IN) then the more also high level Competitive Advantage (CA). Research results on testing hypothesis sixth that is accepted. it because innovation give influence significant to competitive advantage. Research results this is also consistent with study previously studied by Ferreira et al., (2017), Chatzoglou & Chatzoudes (2018), Kuncoro & Suriani (2017), Afraz et al., (2018) and Hatani (2002), but compared backwards with those studied by Wang & Zang (2021), Adietya et al., (2015)

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The influence of innovation mediates the relationship between management accounting information and competitive advantage

The seventh hypothesis in this study is the influence of innovation mediates the relationship between management accounting information and competitive advantage. The seventh hypothesis in this study formulates that management accounting information and innovation have a positive influence and innovation and competitive advantage have a positive influence, so it is possible that innovation can mediate the effect of management accounting information on competitive advantage. The results of the research on testing the seventh hypothesis are accepted. The results of this study are also in line with previous research conducted by Han & Gao (2019), where innovation technology has an effect on company excellence and innovation management also has an effect on company excellence.

Judging from the research above, the researcher sees that there is a mediating role for innovation that has never been studied and researched by previous researchers, regarding the relationship between management accounting information and competitive advantage. Researchers saw a positive relationship or a strong relationship between management accounting information and innovation, as well as a positive relationship or a strong relationship between innovation and competitive advantage.

CONCLUSION

This research was conducted to find out whether there is an influence of Management Accounting Information on Competitive Advantage by mediating the Decision Making Effectiveness and Innovation. Primary data was obtained from the head of the factory/financial manager/operations manager/marketing manager/who can represent the population used in this study, namely companies in the manufacturing sector in the Surabaya Industrial Estate Rungkut (SIER) area, Surabaya, East Java, with a sample size used in the observation of 82. This study was to examine the effect of Total Management Accounting Information on Competitive Advantage, then to test the effect of Total Management Accounting Information on Decision Making Effectiveness. Furthermore, to test the effect of Decision Making Effectiveness mediating the relationship of Management Accounting Information on Competitive Advantage, then to test the effect of Management Accounting Information on Innovation, then to test the effect of Innovation on Competitive Advantage. Lastly, to test the effect of Innovation mediating the relationship of Management Accounting Information to Competitive Advantage.

The results of this study provide findings that it is important for manufacturing companies to have a dominant service logic that originates from management accounting information (controllers or parties that produce information) in the context of manufacturing servitization which in turn is able to increase competitive advantage, while the users in this study are factory leaders/ marketing/ parties that deal directly with customers as strategic decision makers in the company have a role in making decisions, as long as this information is needed. On the other hand, the amount of management information (financial and non-financial) can also be used by management to seek innovation that can also increase competitive advantage.

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