PERCEPTIONS OF AND INTENTIONS TO USE VALUE STREAM COSTING IN LEAN MANUFACTURING ENTERPRISES IN TURKEY[*]

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Araştırma Makalesi/*Research Article*

Muhasebe Bilim Dünyası Dergisi
Haziran 2024, 26(2), 102-136

ABSTRACT

New methods such as value-stream costing (VSC) and management, which focuses on shortening production times and providing added value for the customer, have become necessary because of rapid developments in technology. The purpose of this study is to examine the intentions of lean companies in Turkey to apply VSC. Survey data analyzed with SPSS and AMOS show that the perceived ease of use for the individual has a significant effect on both the intention to apply VSC and the perception of usefulness for the individual while that for the organization affects the perception of usefulness for the organization.

Keywords: Value-stream costing, lean decision-making, lean accounting, lean manufacturing, structural equation model, behavioral intention.

JEL Classification: M40, M41, M11

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[*] Makale Geliş Tarihi (Date of Submission): 04.10.2023; Makale Kabul Tarihi (Date of Acceptance): 13.03.2024. This study is derived from the doctoral thesis titled "Value Stream Costing and Decision-Making: Implementations in Lean Production Businesses", which was accepted in 2022 at Osmaniye Korkut Ata University, Social Sciences Institute, Department of Business Administration.

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Atıf (Citation): Uluç, S.M. & Türk, Z. (2024). Perceptions of and Intentions to Use Value Stream Costing In Lean Manufacturing Enterprises In Turkey. *Muhasebe Bilim Dünyası Dergisi*, *26*(2), 102-136. https://doi.org/10.31460/mbdd.1371234

TÜRKİYE'DEKİ YALIN ÜRETİM İŞLETMELERİNİN DEĞER AKIŞI MALİYETLEMEYE YÖNELİK ALGILARI VE KULLANIM NİYETLERİ

ÖZ

Teknolojideki hızlı gelişmeler sonucunda, üretim sürelerinin kısaltılmasına ve müşteriye katma değer sağlanmasına odaklanan değer akışı maliyetlemesi (DAM) ve yönetimi gibi yeni yöntemler gerekli hale gelmiştir. Bu çalışmanın amacı Türkiye'deki yalın işletmelerin DAM'ı uygulama niyetlerini incelemektir. SPSS ve AMOS ile analiz edilen anket verileri, birey için algılanan kullanım kolaylığı algısının hem DAM uygulama niyeti hem de birey için algılanan fayda üzerinde anlamlı bir etkiye sahip olduğunu; organizasyon için algılanan kullanım kolaylığının ise organizasyon için algılanan faydayı etkilediğini göstermektedir.

Anahtar Kelimeler: Değer akışı maliyetleme, yalın karar verme, yalın muhasebe, yalın üretim, yapısal eşitlik modeli, davranışsal niyet.

JEL Sınıflandırması: M40, M41, M11

GENİŞLETİLMİŞ ÖZET

AMAÇ VE MOTİVASYON

Bu araştırmanın amacı, Türkiye'deki yalın üretim işletmelerinin değer akışı maliyetlemeye ve karar verme süreçlerinde yalın maliyet bilgilerinin kullanımına yönelik tutumlarının ve değer akışı maliyetlemeyi kullanım niyetlerinin araştırılmasıdır. Bu doğrultuda, sözü edilen işletmelerin kullandıkları maliyetleme yöntemlerine ilişkin sorunlara yönelik tutumlarının tespit edilmesi de amaçlanmaktadır.

Türkiye'de faaliyet gösteren işletmelerin yalın üretim, yalın muhasebe ve değer akışı maliyetleme konusundaki farkındalıklarının artmasıyla birlikte, üretim sistemlerini değiştirmeye ve yalın dönüşüme karar veren işletmelerin, muhasebe sistemlerini ve maliyetleme yöntemlerini değiştirmeleri gerekmektedir. Yalın muhasebe sisteminin ortaya çıkmasıyla birlikte, yalın muhasebe, yalın maliyet yönetimi ve değer akışı maliyetleme yöntemlerine odaklanan araştırmalar yapılmış olmasına rağmen, uygulama düzeyinde olan araştırmaların yeterli olmadığı belirlenmiştir. Bu araştırmanın, yalın üretim sistemini uygulayan ve muhasebe süreçlerini yalın muhasebe sistemine dönüştürmeyi planlayan işletmelere yol gösterici nitelikte olacağı düşünülmektedir.

ARAŞTIRMA STRATEJİSİ VE YÖNTEMİ

Araştırmanın evrenini Türkiye'de faaliyet gösteren yalın işletmeler oluşturmaktadır. Araştırmanın kapsamı 2020 yılı ve öncesinde, yalın dönüşüm için danışmanlık ve eğitim hizmeti almış 454 işletme

ile sınırlıdır. Bu araştırma için, %95 güven seviyesinde evreni temsil edebilecek en az örneklem büyüklüğü, Naing ve diğerleri (2006) ve Burak ve Deniz (2021) tarafından gerçekleştirilen çalışmadaki formül ile 208 olarak hesaplanmıştır. Evrenden rastgele örnekleme yoluyla seçilen 416 işletmenin (en az örneklem büyüklüğünün iki katı) muhasebe, maliyet muhasebesi/yönetimi, yalın üretim/yönetim/muhasebe bölümlerine anket formu gönderilmiştir. Anket formunda yer alan ifadelerin anlaşılabilirliğinin test edilmesi için 40 işletmeden oluşan bir gruba yapılan pilot uygulama sonucunda, ifadelerin doğru ve net olarak anlaşıldığı sonucuna varılmıştır. 217 işletme tarafından cevaplanan anket verilerinin analizinde "*SPSS (Statistical Package for the Social Sciences) for Windows 24.0"* ve *"AMOS (Analysis of Moment Structures) 24.0"* istatistik paket programlarından yararlanılmıştır.

Araştırmanın modelini, değer akışı maliyetleme ve karar verme sürecine yönelik tutum, değer akışı maliyetlemenin benimsenmesini etkileyen faktörlere (kullanım kolaylığı ve fayda) yönelik algılar ile değer akışı maliyetleme kullanım niyeti arasındaki ilişkiler oluşturmaktadır. Ölçeklerde yer alan maddelerin yapı geçerliliğinin test edilmesi için pilot uygulama aşamasında 40 katılımcıdan toplanan veriler SPSS programı yardımıyla açıklayıcı faktör analizi (AFA) ile test edilmiştir. Elde edilen faktörlerden yola çıkarak ölçeklere ilişkin güvenilirlik analizi gerçekleştirilmiştir. Verilerin tamamı toplandıktan sonra, AMOS programı yardımıyla doğrulayıcı faktör analizi (DFA) uygulanarak ölçüm modelleri ile veri uyumunun kabul edilebilir olduğu belirlenmiştir. Bu doğrultuda, değer akışı maliyetleme ve karar verme süreçlerinde yalın maliyet bilgilerinin kullanımına yönelik tutumların ve değer akışı maliyetlemenin benimsenmesini etkileyen faktörlere yönelik algıların, işletmelerin değer akışı maliyetleme kullanım niyetlerini etkileyip etkilemediği test edilmiştir.

Timm (2015) tarafından, Davis (1989)'in Teknoloji Kabul Modeli Ölçeğinden uyarlanarak geliştirilen değer akışı maliyetlemenin benimsenmesini etkileyen faktörler ölçeğine göre, yeni bir teknoloji için algılanan kullanım kolaylığı, o teknolojinin ne kadar faydalı olacağına ilişkin algıyı ve teknolojinin kullanımına yönelik tutumu etkilemektedir. Bu tutum, teknolojinin algılanan faydasından da doğrudan etkilenmektedir. Algılanan kullanım kolaylığı ve faydanın, başlangıçta beklendiği gibi niyet üzerindeki etkisine tam olarak aracılık etmediği gerekçesiyle, tutum değişkeninin modelden çıkarılmasını öneren araştırmalar da mevcuttur. Bu doğrultuda, araştırma, değer akışı maliyetleme ve karar verme süreçlerinde yalın maliyet bilgilerinin kullanımına yönelik tutumun aracılık ettiği model (önerilen model) üzerinden yürütülmüştür. Ardından, tutum değişkeninin çıkarılmasından sonraki revize (düzeltilmiş) model ile test edilmiştir.

BULGULAR VE TARTIŞMA

Araştırmada, yalın işletmeler arasından, geleneksel maliyet muhasebesi yöntemlerini kullanan işletmeler ile yalın maliyet muhasebesi (değer akışı maliyetleme) yöntemini kullanan işletmelerin çeşitli ifadelere yönelik tutumlarının belirlenmesi amaçlanmıştır. Ayrıca, yalın muhasebenin ve değer akışı

maliyetlemenin kullanımına yönelik tutumlarının ve değer akışı maliyetleme kullanım niyetlerinin araştırılması hedeflenmiştir.

Araştırmaya katılan işletmelerin büyük bölümü, maliyet muhasebesi verilerini maliyet yönetimi amacıyla kullanmakta iken standart maliyetleme yöntemini kullanan işletmeler bu verileri maliyet kontrolü amacıyla kullanmaktadır. Yalının sağlayacağı iyileştirme sürecinde işletmelerin en çok önem verdiği unsurlar verimlilik artışı ile müşteri memnuniyetidir. Araştırma kapsamındaki temel değişkenlerden en yüksek ortalamaya sahip olan "Performans ölçütlerinin tespiti" değişkenidir.

Araştırmanın modeli ile verilerin uyumluluğunun test edilmesi için uyum indeksleri aracılığıyla yapısal modelin istatistiksel açıdan geçerliliği incelenmiştir. Araştırmanın modeli ile modelden elde edilen veriler arasında yeterli düzeyde uyum sağlanamadığı görülmüştür. Daha önce de ifade edildiği gibi, tutum değişkeninin modelden çıkarılmasını öneren araştırmalara dayanarak, standartlaştırılmış regresyon katsayıları da dikkate alınarak, tutum değişkeninin modelden çıkarılmasına karar verilmiş ve model tekrar kurulmuştur. Düzeltilmiş yapısal model, değer akışı maliyetleme kullanım niyetine etki eden hem birey hem de organizasyon için algılanan kullanım kolaylığı ile bu ilişkilere aracılık eden hem birey hem de organizasyon için algılanan fayda değişkenlerinden oluşmaktadır.

Araştırma modeline ilişkin yol katsayıları ve araştırma modelinde tanımlanan ilişkilerin analiz bulguları sonucunda, örtük değişkenler arasındaki doğrudan etkilerin yanı sıra dolaylı etkiler de dikkate alınmıştır. Buna göre, sadece üç etkinin istatistiksel açıdan anlamlı olduğu görülmektedir. Şöyle ki, birey için algılanan kullanım kolaylığı ve algılanan fayda ile organizasyon için algılanan kullanım kolaylığı ve algılanan fayda değişkenleri arasında sadece doğrudan etki bulunurken; birey için algılanan kullanım kolaylığı ile kullanım niyeti değişkenleri arasında ise dolaylı etkiden söz etmek mümkündür. Ancak birey için algılanan kullanım kolaylığı ile kullanım niyeti arasına eklenebilecek bir değişkenin etkisinin negatif yönlü olduğu ve bu nedenle etkinin değerini azaltıcı yönde olduğu söylenebilir.

Konuya ilişkin önceki araştırmalardan Timm (2015), değer akışı maliyetlemesinin benimsenmesine yönelik faktörlerin (PEOU, PU) hem birey hem de organizasyon için değer akışı maliyetleme kullanım niyetini (BI) pozitif yönde etkilediğini ve istatistiksel olarak anlamlı olduğunu ortaya koymuştur. Chau ve Hu (2001), TKM'yi (Teknoloji Kabul Modeli) sağlık alanına uyarlayarak test etmişler, teknoloji kullanımına yönelik tutum ile niyet arasında istatistiksel olarak anlamlı bir etki olduğunu; algılanan faydanın, tutumun ve niyetin önemli belirleyicisi olduğunu; algılanan kullanım kolaylığının ise, tutum ve niyet üzerinde istatistiksel olarak anlamlı bir etkisinin bulunmadığını belirlemişlerdir. Venkatesh ve Davis (1996) ise, TKM'den tutum değişkeninin çıkarılarak revize edildiği modeli test etmişlerdir. Algılanan kullanım kolaylığı ve faydanın, niyetin belirleyicisi olduğunu, algılanan kullanım kolaylığının niyet üzerinde hem doğrudan etkisinin hem de algılanan fayda aracılığıyla dolaylı etkisinin olduğunu belirlemişlerdir.

SONUÇ VE ÖNERİLER

Bu araştırmada, Türkiye'deki 217 yalın üretim işletmesinin, değer akışı maliyetleme kullanım niyetlerinin tespiti amaçlanmıştır. Araştırmaya katılan işletmelerin, değer akışı maliyetleme kullanım niyetleri üzerinde etkili olabilecek değişkenlerin belirlenmesine yönelik yapısal eşitlik modeli oluşturulmuştur. Modelin veri ile yeterli düzeyde uyum gösterdiği, bu nedenle istatistiksel olarak geçerli bir model olduğu söylenebilir. Hipotez testinin sonucu, birey için algılanan kullanım kolaylığının (PEOU-I) hem DAM kullanım niyeti (BI) üzerinde hem de birey için algılanan fayda (PU-I) üzerinde anlamlı bir etkiye sahip olduğunu; organizasyon için algılanan kullanım kolaylığının (PEOU-O) ise organizasyon için algılanan faydayı (PU-I) etkilediğini göstermektedir.

Araştırma sonucunda işletmelerde, yalın üretim sisteminin uygulanmasına bağlı olarak, yalın muhasebe ve değer akışı maliyetleme kullanım niyetinin bulunduğu söylenebilir. Ancak, operasyonel gelişimin finansal sonuçlar üzerindeki olumlu etkisinin zaman alması, işletmeleri yalın dönüşüm konusunda düşündürmektedir. Bu işletmelerin, yalın yolculuk sürecinde, bu konuda danışmanlık yapan kuruluşlar tarafından desteklenmeleri, süreci başarıyla tamamlamalarına yardımcı olabilecektir. Araştırmanın kapsamı 2020 yılında Türkiye'de yalın üretim sistemini uygulayan işletmeler ile sınırlıdır. Sonraki dönemlerde ve araştırmanın kapsamındaki işletmelere ek olarak farklı sektörlerde faaliyet gösteren, farklı organizasyonel yapıdaki işletmelere yönelik araştırmalar yapılabilir.

1. INTRODUCTION

The two great thinkers who are claimed to have shaped the manufacturing industry are Henry Ford and Taiichi Ohno. Ford has revolutionized the use of flow lines in mass production. Ohno, on the other hand, convinced the entire industry that inventories are not assets, but debts, and developed the Toyota Production System (TPS) based on Ford's ideas (Goldratt, 2009). The basic principles of the system, known today as the "Lean Manufacturing System", were developed at Toyota Motor Company (TMC) in Japan (Ertuğrul et.al., 2013). During the crisis period after Japan's defeat in World War II, Japanese engineers Taiichi Ohno and Eiji Toyoda of Toyota developed the widely spread lean manufacturing system, then known as the "Toyota Production System" (Carvalho & Leite, 2021).

In the lean manufacturing environment, production is carried out at the cell level, and actual costs are calculated and reported based on value streams through lean accounting (Maskell et.al., 2011). According to Pech and Vaněček (2018), new improvement methods have become necessary because of rapid developments in technology. On top of this, "value stream management", which focuses on shortening the production time and providing added value for the customer, has become widely used in large industrial enterprises. "Value-stream costing", which is used to calculate the costs of value streams,

is defined by Cesaroni and Sentuti (2014) as "a simple summary of the direct costs of the value stream". Cesaroni and Sentuti (2014) have argued that cost allocation is indeed reduced through this method.

It has been documented that the existing research in the literature on enterprises adopting the lean manufacturing system consider "lean" from various standpoints. Initial research has generally focused on the lean manufacturing system and lean tools. The number of studies on the subject has expanded along with the increasing awareness of the lean manufacturing systems and studies that focus on lean accounting systems and that address issues with conventional accounting methods in lean settings have been carried out. Some of the research focused on lean transformation processes (Deflorin & Scherrer-Rathje, 2012; Arslandere, 2017), implementation of lean manufacturing systems (Ertuğrul et.al., 2013; Pech and Vaněček, 2018), lean manufacturing tools (Shah & Ward, 2003), and value stream mapping (VSM) from these tools (Abdullah, 2003; Fritzell & Göransson, 2012; Li, 2014; Aishah bint Awi, 2016; Lindholm, 2018; Melsas, 2018). In some studies, lean accounting practices were analyzed and compared to conventional costing methods (Rao & Bargerstock, 2011; Özçelik, 2011; Darabi et.al., 2012; Okpala, 2013), while some research focused on lean cost management (Chen & Cox, 2012; Onat, 2012; Grasso et.al., 2015). Case studies on lean accounting practices (Kennedy & Widener, 2008; Ofileanu, 2016) and surveys (Kennedy et.al., 2010; Arora, 2016) were used in other studies. While there are theoretical studies in the literature on Value Stream Costing (VSC) used to calculate production costs in lean enterpriseses (Karcıoğlu & Nuray, 2010; Aktaş, 2013; Kaldırım & Kaldırım, 2018; Türk & Çeviren, 2018), there is applied research on VSC as well. In these studies, Fullerton and Kennedy (2010) used survey methodology whereas Kennedy and Brewer (2005), Deran and Beller (2014), Aksoylu (2014), Kaya and Hatunoğlu (2020), Büyükarıkan (2021) and, Türk and Uluç (2022) used case study analysis to determine production costs. There are also VSC studies in which the mixed method, which include both case and survey methods, is used (Tancı Yıldırım, 2020) and studies focusing on the performance of value streams (Keskin, 2010; Ayçin, 2016). There is also other research that comparatively considers the use of VSC and standard costing in pricing, profitability and production/purchasing decision-making processes in lean enterprises (Karcıoğlu & Nuray, 2010) and some studies that theoretically focus on lean management, lean accounting and the use of cost information in business decisions (Chopra, 2013). Some studies (Aktaş, 2013; Kefe & Berikol, 2019) also discuss the use of VSC in business decisions in comparison with traditional costing method through examples. Given that "lean" is a production system, the first studies with a "lean" focus were engineering-oriented studies based on the results obtained from the literature search conducted as part of this study. Since the introduction of lean accounting systems, research has focused on VSC, lean cost management, and lean accounting. It appears that the investigations at the application level, however, are seemingly insufficient.

Hence, this research focuses on determining the attitudes of lean enterprises in Turkey towards traditional accounting and lean accounting, their attitudes towards VSC, the use of lean cost information in decision-making processes, and their intentions to use VSC.

2. VALUE-STREAM COSTING AND ELEMENTS

Value stream, which is considered a process in which businesses value their customers, is defined as "the sequence of works in the process of transforming and delivering a product to the customer" or "a product/service group or family that goes through the same process steps" (Barney & Kirby, 2004). Value streams cover all stages in the production process, starting from the customer order to the delivery (purchasing, producing, sales, marketing, delivery, customer service, and maintenance, etc.), which are required to monetize the products/services and resources (labor, materials, machinery, and equipment, etc.) (Kennedy & Brewer, 2006; Duque & Cadavid, 2007; Cesaroni & Sentuti, 2014).

In VSC method, which is used as a costing method suitable for the purposes of the lean thinking approach in lean accounting, time is not wasted with methods such as standard costs and deviation analyses used in traditional costing. Conversely, accounting practices are simplified and almost all costs are attributed directly to value streams. Indirect costs are minimal. The profitability of the enterprise is evaluated by considering the possible effects on resource capacity and financial criteria (Özçelik & Ertürk, 2010). According to Maskell and Katko (2007), VSC should be applied not only for costing purposes but also for the purpose of making business decisions and valuing stocks.

Cost and profitability reporting is also done with VSC that consists of a simple summary of value streams and direct costs (Maskell & Baggaley, 2006; Katko, 2019). In the VSC method, it is possible to report costs by calculating them based on value streams and to calculate the average product cost. However, in this method, it may not be possible to determine the unit cost of the products. For example, when making pricing decisions, businesses implementing VSC do not reckon with the unit costs of products; thus, there is also no need to calculate the unit cost of certain products contrary to the applications in traditional costing methods. Because in lean enterprises, customer value determines the price, and customer value, which lean enterprises focus on, is not associated with product costs (Maskell et.al., 2011).

The process of VSC starts with a value stream map. The actual value-stream costs can be calculated for each value stream, through the information obtained from the mapping process created for the use of employees, equipment and physical space. There is no need to try to distribute costs outside the value stream to the value stream since all costs within the value stream are considered as direct costs for the value stream. Figure 1 shows typical value-stream costs (Maskell & Katko, 2007).

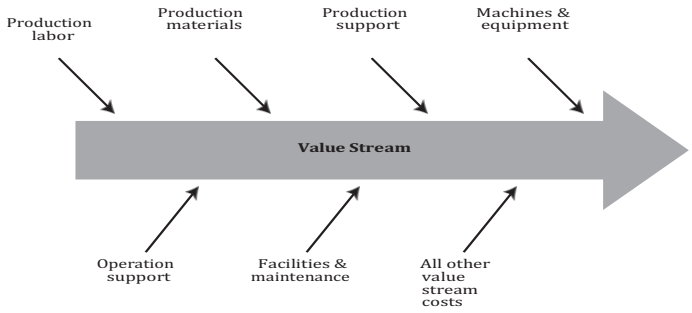

Figure 1. Value-stream Cost Elements

Source: Maskell et al., 2011.

Value Stream Labor Costs: Labor costs are obtained from the payrolls of the enterprise based on the real persons working in the value stream defined in the value stream map (Maskell & Katko, 2007).

Value Stream Raw Material (Material) Costs: Material costs are calculated based on the actual material the value stream purchases or pulls from material inventories (Maskell & Katko, 2007). Material costs are recorded at the level of direct value stream, without being distributed to products (Maynard, 2007).

Value Stream Machines and Equipment Costs: Alongside the costs such as spare parts, repairs and consumables, value stream machinery and equipment cost consist of depreciation expense of the machines. The fixed asset and depreciation system of the enterprises can be used to calculate depreciation expense (Maskell & Katko, 2007).

Value Stream Facilities and Maintenance Costs: Facility and maintenance costs (also known as operating costs) consist of real costs such as rent, repairs, maintenance and external benefits (Maskell & Katko, 2007).

Value Stream Support Costs: Support costs consist of costs that are expressed as "indirect" in traditional methods, such as maintenance, quality, engineering, auditor, materials management, planning and purchasing (Maskell & Katko, 2007).

Value Stream External Transaction Costs: It consists of the costs of the works/transactions commissioned outside the enterprise related to the production process. Amounts which are provided from invoices or accounting records are transfered to the value streams (Kaldırım & Kaldırım, 2018).

All Other ValueSstream Costs: Other value-stream costs consist of various elements such as office and travel expenses and the costs of consumed appliances (cited in Maskell et.al., 2007; Kaldırım & Kaldırım, 2018). These are costs such as spare parts, repairs, and consumables (Maskell & Katko, 2007).

The total value-stream cost consists of the sum of all the direct costs mentioned above (Maskell et.al., 2011).

To put it plainly, the value stream profit (Katko, 2019), which consists of the difference between the income and expenses of the value stream, is effortlessly calculated based on the difference between the income and the cost of sales (the sum of material and conversion costs). While profit is regarded as a different concept from cash flow in traditional accounting, in the lean accounting environment, value stream profit is used as equivalent to cash flow. In the value stream income statement, increases or decreases in stocks do not affect the cost of sales (Durmuşoğlu, 2020).

The key to the lean approach is to minimize the stock level in all processes of the value stream. Reporting of the stock level changes within the value stream in the value stream income statement reinforces this understanding (Kennedy & Brewer, 2006; Katko, 2019). This not only demonstrates the results of stock reduction efforts but also guarantees that value stream teams do not store excess stock (Kennedy & Brewer, 2006). In the value stream income statement, it is possible to report profit centers according to their value streams, it is possible for each of the value streams to represents a separate product family or customer group, and it is also possible to display separately the cost elements (such as material, labor, machinery and equipment, plant cost) for each value stream. In this manner, rapid detection of the basic reasons for problems, performing productivity analysis and profitability analysis of value streams are possible (Apilioğulları, 2018; Katko, 2019).

Rather than a single product, value stream profitability is taken into consideration to be shown as a reference when making routine business decisions in lean enterprises (Maskell & Katko, 2007; Maskell et al., 2011). It is recommended to decide whether the value stream of the planned activities will increase cash profitability (Baggaley, 2003). For this, a financial analysis is carried out based on the change in profitability of the value stream in a certain period (for example, one month). If the future profit of the value stream is higher than the profit in the current period, the operating decisions are considered financially appropriate (Katko, 2019). While VSC considers all conversion costs to be constant, it treats material costs as the sole cost item relevant for decision-making (Ruiz-de-Arbulo-Lopez et al., 2013). Some indicators are used to make appropriate decisions on issues such as accepting special orders or producing/purchasing (Maynard, 2007; Ofileanu, 2015). They provide an insight into operational and financial performance and capacity utilization that are correlated with each other depending on the achievement of the set goals while presenting the operating results of the enterprise (Ofileanu, 2015).

3. STRUCTURAL EQUATION MODEL

The structural equation model (SEM) is known as a second-generation data analysis technique as opposed to the first-generation statistical analysis techniques such as regression. Thanks to the modeling of the relationships between one or more independent variables and one or more dependent variables, it

enables even complex research problems to be analyzed with a single model systematically and comprehensively (Dursun & Kocagöz, 2010; Akinyode, 2016). SEM is used in cases where first-generation statistical methods (for example, regression analysis) are not sufficient for the exact revelation of the relationships between the variables and where the relationship between two variables may arise depending on a third variable (Alpar, 2021). The measurement mistakes are also added into the model in SEM (Civelek, 2018). In closing, because of testing the multivariate models, it is ensured that more realistic results are obtained in the calculation process of direct and indirect impacts (Ocak, 2020). The most effective component of SEM is typically that it requires prior knowledge or hypotheses about the potential relations between the variables (Tabachnick & Fidell, 2020). SEM is used to test models in which correlation and causal relationships between the observed variables and the implicit variables associated with observed variables coexist (Tüfekçi & Tüfekçi, 2006). SEM, which is used to predict dependency relationships, is a multivariate method, consisting of a combination of factor analysis, canonical correlation and regression analysis (Dursun & Kocagöz, 2010; Tabachnick & Fidell, 2020). It is like factor analysis in terms of having implicit and observable variables; it is like canonical correlation analysis in terms of having many dependent and independent variables; it is also similar to multiple regression analysis in terms of examining the relationship between many variables (Tabachnick & Fidell, 2020).

In SEM, which is created among implicit variables, both the measurement model and the structural model coexist (Civelek, 2018). In this respect, a two-stage approach is followed in testing of structural models through SEM-based analysis. In the first stage, the measurement model is tested to evaluate the relationships between the variables subject to analysis. In the second stage, the structural model is tested to determine the causal relationships among the variables (Gürbüz, 2021). The measurement model and the structural model are evaluated separately in determining whether the SEM is defined or not. The key criterion is that the measurement model is defined (a valid model) so that the structural part of the SEM can be logically evaluated (Kline, 2019). To do this, both the measurement model and the structural model should be evaluated based on the goodness of conformity values and test statistics obtained because of the analysis (Gürbüz, 2021). After providing sufficient harmony between the statistical model and the data set, the new stage starts where the hypotheses will be tested (Gürbüz, 2021, p.46).

4. METHODOLOGY OF RESEARCH

This section discusses the population, sample, model, hypotheses, measurement tool, method, reliability and validity analysis employed in the research.

4.1. Population and Sample

The population of this research consists of lean businesses operating in Turkey. The scope of the research is limited to 454 businesses that received consultancy and training services for lean transformation in 2020 and before. For this research, the minimum sample size that could represent the universe at a 95% confidence level is calculated as 208[1] with the help of the formula in Naing et al. (2006) and Burak & Deniz (2021). A survey form is sent to 416 businesses (at least twice the minimum sample size) selected from the universe by random sampling. Since the response rate of the surveys answered by 217 businesses (217/416) is 52.16%, one can conclude that it can be analyzed and evaluated appropriately for the research.

4.2. Model and Hypotheses

As can be seen in Figure 2, as a result of the literature review on the subject, the relationships between perceived ease of use (PEOU-I / PEOU-O) and perception of usefulness (PU-I / PU-O) of value-stream costing, the variables of attitude towards value-stream costing (VSC) and decision-making process (DMP) and behavioral intention to apply value-stream costing (BI) constitute the research model.

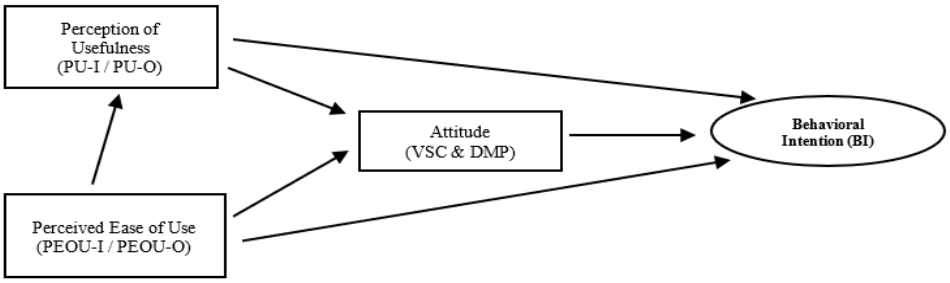

Figure 2. The Research Model

The behavioral intention to apply value-stream costing scale is developed by Timm (2015) based on Davis (1989)'s Technology Acceptance Model (TAM) Scale. TAM assumes that an individual's intention to use a new technology can be jointly explained by his or her perception of its usefulness and ease of use of the technology and his or her attitude toward the use of technology (Chau & Hu, 2001; Davis, 1989). In accordance with this, the perceived ease of use of the technologies used for the first time affects the perception of how useful those technologies will be and their attitude towards the use of the technology. Attitude is also directly influenced by the perceived usefulness of the technology (Chau & Hu, 2001; Taylor & Todd, 1995; Mathieson, 1991; Davis et al., 1989). There is also some research suggesting that the attitude variable should be removed from the model on the grounds that the perceived ease of use and usefulness does not fully mediate its effect on intention as initially expected

[1] $n = (454*(1,96)^2*(0,5*0,5)) / ((0,05)^2*(454-1) + (1,96)^2*(0,5*0,5)) = 208,33$

(Venkatesh & Davis, 2000; Venkatesh & Morris, 2000; Venkatesh, 1999-2000; Venkatesh & Davis, 1996). As presented in Figure 2, this research is conducted primarily on the model mediated by the attitude towards value-stream costing and the use of lean cost information in the decision-making processes. It is then tested with the revised model after removing the attitude variable.

In this study, SEM is used to investigate the effects of independent variables on the dependent variable. The dependent variable of the research is BI. The independent variables consist of the attitude (VSC and DMP) and perception (PEOU-I, PEOU-O, PU-I, PU-O). PU-I and PU-O, and attitude variables (VSC / DMP) are also intermediary variables. The hypotheses (H_0) created within the scope of the research model are listed as follows. In lean enterprises:

H_{01}: Perceived ease of use (PEOU-I/PEOU-O) of value-stream costing has no effect on perception of usefulness (PU-I/PU-O) of value-stream costing.

$H_{01.1}$: PEOU-I has no effect on PU-I.

$H_{01.2}$: PEOU-O has no effect on PU-O.

H_{02}: Perception of usefulness (PU-I/PU-O) of value-stream costing has no effect on the behavioral intention (BI) to implement value-stream costing.

$H_{02.1}$: PU-I has no effect on BI.

$H_{02.2}$: PU-O has no effect on BI.

H_{03}: Perception of usefulness (PU-I/PU-O) of value-stream costing has no effect on attitudes towards both value-stream costing (VSC) and use of lean cost information in decision-making processes (DMP).

$H_{03.1}$: PU-I has no effect on attitudes towards VSC.

$H_{03.2}$: PU-I has no effect on DMP.

$H_{03.3}$: PU-O has no effect on VSC.

$H_{03.4}$: PU-O has no effect on DMP.

H_{04}: Perceived ease of use (PEOU-I/PEOU-O) of value-stream costing has no effect on attitudes towards both value-stream costing (VSC) and use of lean cost information in decision-making processes (DMP).

$H_{04.1}$: PEOU-I has no effect on VSC.

$H_{04.2}$: PEOU-I has no effect on DMP.

$H_{04.3}$: PEOU-O has no effect on VSC.

$H_{04.4}$: PEOU-O has no effect on DMP.

H_{05}: Attitudes towards both value-stream costing (VSC) and use of lean cost information in decision-making processes (DMP) has no effect on behavioral intention (BI) to apply value-stream costing.

$H_{05.1}$: VSC has no effect on BI.

$H_{05.2}$: DMP has no effect on BI.

H_{06}: Perceived ease of use (PEOU-I/PEOU-O) of value-stream costing has no effect on behavioral intention (BI) to implement value-stream costing.

$H_{06.1}$: PEOU-I has no effect on BI.

$H_{06.2}$: PEOU-O has no effect on BI.

The research is carried out within the framework of sixteen sub-hypotheses established within the framework of six main hypotheses.

4.3. Measuring Tools

The questionnaire, which includes the scales used in the research, consists of six sections and 81[2] questions. In the first part of the questionnaire, there are questions about some demographic characteristics of the enterprise. The second part includes questions about the firm's purpose for using the cost accounting data and the ranking of some elements related to the enterprise according to their degree of importance. The scale of "traditional accounting system in lean manufacturing environments" in the third part of the questionnaire is adapted from Özçelik (2011). In the fourth section, there are statements to determine the changes in the accounting system of the enterprise after the transition to lean manufacturing. The scale "value-stream costing and decision-making process" in the fifth section is created by using the studies of Maskell et al. (2011), Maskell and Katko (2007), Maynard (2007), Maskell and Kennedy (2007), Kennedy and Brewer (2006), Maskell and Baggaley (2006) and by adapting from Özçelik (2011). The "behavioral intention to apply value-stream costing" scale in the sixth section is adapted from Timm (2015). The five-digit Likert scale is used for the statements in the second, third, fifth and sixth sections of the questionnaire. Ethical consent forms were received via e-mail from the researchers whose scales were used to create the questionnaire.

The reliability of the scales developed by Özçelik (2011), which were used to create the data collection tool, is tested by the author. The reliability and validity of the scale developed by Timm (2015) were also tested by the author himself. The scale used by Timm is translated from English to Turkish

[2] It is possible to access the scale items from the corresponding author's doctoral thesis or by contacting the corresponding author.

and this data collection tool is finalized after making sure that the translation is accurate by taking the opinion of an expert in both languages.

As a result of the pilot application administered to a group of 40 businesses, it is concluded that the expressions were understood correctly and clearly. During the pilot study, surveys were administered face to face. The research is conducted using survey forms prepared via "Google Forms" due to the Covid-19 Pandemic. The link to the form is sent via e-mail to the accounting, cost accounting/management, lean production/management/accounting units of the sample businesses. It is also sent to businesses whose e-mail addresses could not be reached via a professional business network and social sharing platform.

4.4. Method

The data collected with questionnaires were analyzed with the help of "SPSS for Windows 24.0" and "AMOS 24.0" programs. In this study, since the skewness and kurtosis values are between "±1", it can be concluded that the data approaches the normal distribution (Hair et al., 2014; Tabachnick & Fidell, 2020; Büyüköztürk et al., 2020; George & Mallery, 2010).

For validity analysis, the data collected from 40 participants during the pilot application aretested with "Exploratory? Factor Analysis (EFA)" using the SPSS program. After all the data were collected, "Confirmatory Factor Analysis (CFA)" is applied with the help of the AMOS program. In addition, reliability analysis of scales is performed by considering the factors obtained from EFA. Descriptive statistics were then generated. Finally, to test the research hypotheses, Structural Equation Model (SEM) is used to examine the relationships among the variables.

4.5. Reliability Analysis

As a result of the reliability analysis for the scales used for data collection, it is concluded that both the overall scale consisting of 56 items (0.966) and the subscales (in the range of 0.754-0.925) have a "very high" level of reliability. Reliability analysis could not be performed because the dependent variable (BI) consisted of one item. Özçelik (2011) determined that the "Perspective on Traditional Accounting System Problems in the Lean Manufacturing Environment (TA)", "Perspective on the Changes Required by the Lean Manufacturing System (CHN)" and "Perspective on Performance Criteria (PERF)" scales (0.72) and the scale related to lean accounting (VSC) (0.89) have a high degree of reliability. Timm (2015), on the other hand, determined in her reliability analysis for BI that both the overall scale (0.971) and all items separately showed high internal consistency (in the range of 0.968-0.793).

4.6. Validity Analysis

In this research, the factor structure of the measurement tool was determined by applying EFA to the data collected during the pilot application phase. After all the data were collected, the factor structure determined by EFA is verified through the CFA.

4.6.1. Exploratory Factor Analysis

In this study, EFA and other statistical tests are carried out using the SPSS statistical program. "Principal Component Analysis (PCA)" is used as the estimation procedure, "Kaiser" method used as the normalization method, and "Direct Oblimin (DO)" technique used as the factor rotation technique.

In Table 1, EFA results, which consist of 10 variables, are shown regarding the variables of "TA". Given the Kaiser-Meyer-Olkin (KMO) value (0.742), we can conclude that the adequacy of the sample is at a "good" level in terms of factor analysis. The Bartlett test ($\chi^2(15) = 104.269$; $p<0.05$) shows that the items on the scale are suitable for factor analysis. One can conclude that the data come from the multivariate normal distribution and that approximately 55.988% of the variance explained by the 10 variables is reduced to a single factor that can be explained by 6 variables. According to Hair et al. (2014), in the field of social sciences, a solution that accounts for 60 percent (and in some cases even less) of the total variance is considered sufficient while Alpar (2011) considers an explained variance of 0.50-0.70 to be sufficient. Accordingly, we can conclude that the contribution of the single factor obtained to the total variance is sufficient.

Table 1. Perspective on the Traditional Accounting System Problems in Lean Manufacturing Environment Scale EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
TA 1	3,359	55,988	0,818
TA 3			0,813
TA 4			0,794
TA 8			0,728
TA 9			0,697
TA 10			0,621

In Table 2, the adequacy of the sample in terms of factor analysis is at a "good" level given the KMO value (0.723) in the EFA results, which consist of 5 "CHN" variables. Bartlett test ($\chi^2(6) = 104.629$; $p<0.05$) indicates that the scale items are suitable for factor analysis, and in this context, the data come from the multivariate normal distribution. As a result of the analysis, the number of variables is reduced to 4 with the only factor that could explain 71.403% of the variance explained by 5 variables.

Table 2. Perspective on Changes Required by Lean Manufacturing System Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
CHN 1	2,964	71,403	0,933
CHN 2			0,892
CHN 3			0,915
CHN 4			0,678

In Table 3, the KMO value (0.697) in the results of the EFA of the "PERF" variables indicates that the adequacy of the sample is at an "acceptable" level in terms of factor analysis. According to the Bartlett test ($\chi^2(10) = 85.140$; $p<0.05$), which shows that the items in the scale are suitable for factor analysis and that the data come from a multivariate normal distribution. As a result of the analysis, the number of variables reduced to 5 with a single factor in which the variance explained by 7 variables is approximately 59.438%.

Table 3. Perspective on the Determination of the Performance Measures Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
PERF 1	2,972	59,438	0,658
PERF 4			0,662
PERF 5			0,828
PERF 6			0,758
PERF 7			0,917

In Table 4, the KMO value of 0.791 in the EFA (0.791) of the 12 "VSC" variables, indicates that the adequacy of the sample is at a "good" level in terms of factor analysis. As a result of the Bartlett test ($\chi^2(45) = 281.750$; $p<0.05$), it is possible to say that the items in the scale are suitable for factor analysis and that the data come from a multivariable normal distribution. 10 variables are collected under a single factor and explain the majority (60.077%) of the total variance.

Table 4. The Attitude Towards Value-Stream Costing Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
VSC 1	6,008	60,077	0,756
VSC 2			0,676
VSC 3			0,816
VSC 6			0,534
VSC 7			0,891
VSC 8			0,844
VSC 9			0,858
VSC 10			0,743
VSC 11			0,784
VSC 12			0,789

In Table 5, according to the EFA result of the DMP variables "DMP" and consisting of 12 variables, one can conclude that the adequacy of the sample is at a "very good" level with a KMO value of 0.858. The Bartlett test ($\chi^2(15) = 135.839$; $p<0.05$) shows that the items on the scale are suitable for factor analysis and that the data come from a multivariate normal distribution. Six variables collected under a single factor explain about 65.812% of the variance.

Table 5. The Attitude Towards the Use of Lean Cost Information in Decision-Making Processes Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
DMP 1	3,949	65,812	0,695
DMP 2			0,834
DMP 5			0,370
DMP 6			0,728
DMP 8			0,758
DMP 11			0,564

In Table 6, the EFA results for 6 variables for "PEOU-I", which is one of the factors affecting adoption of value-stream costing in lean enterprises, are presented.

Table 6. Perceived Ease of Use for the Individual Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
PEOU-I 1	4,176	69,597	0,841
PEOU-I 2			0,930
PEOU-I 3			0,842
PEOU-I 4			0,760
PEOU-I 5			0,903
PEOU-I 6			0,709

The KMO value (0.846), shows that the adequacy of the sample is at a "very good" level in terms of factor analysis, and according to the Bartlett test ($\chi^2(15) = 169.469$; $p<0.05$), the items in the scale are suitable for factor analysis. Thus, we conclude that the data come from the normal multivariate distribution and the variance disclosure rate is 65.597%.

Table 7. Perception of Usefulness for the Individual Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
PU-I 1	4,309	71,823	0,826
PU-I 2			0,831
PU-I 3			0,855
PU-I 4			0,887
PU-I 5			0,863
PU-I 6			0,822

The EFA results related to the variable "PU-I", one of the factors affecting the adoption of value-stream costing in lean enterprises, which consist of 6 variables, are presented in table 7. The KMO value (0.887), shows that the adequacy of the sample in terms of factor analysis is at a "very good" level. The Bartlett test results ($\chi^2(15) = 153.628$; $p<0.05$) indicate that the items in the scale are suitable for factor analysis and that the data come from a multivariate normal distribution. The disclosure rate of the variance is 71.823%.

Table 8. Perceived Ease of Use for the Organization Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
PEOU-O 1	4,292	71,537	0,821
PEOU-O 2			0,869
PEOU-O 3			0,894
PEOU-O 4			0,832
PEOU-O 5			0,848
PEOU-O 6			0,809

We also present in Table 8, the EFA results for the variable " PEOU-O ", which is another factor affecting the adoption of value-stream costing in lean enterprises, consisting of 6 variables. The KMO value (0.818) indicates that the adequacy of the sample is at a "very good" level in terms of factor analysis. According to the Bartlett test ($\chi^2(15) = 181.464$; $p<0.05$), the sample is at a "very good" level

in terms of factor analysis and the items in the scale are suitable for factor analysis and that the data come from a multivariate normal distribution. The disclosure rate of variance is 71.537%.

Table 9. Perception of Usefulness for the Organization Scale - EFA Results

Scale Items	Eigenvalue	Explained Variance (%)	Factor Load
PU-O 1	4,743	79,044	0,881
PU-O 2			0,957
PU-O 3			0,914
PU-O 4			0,874
PU-O 5			0,888
PU-O 6			0,814

The EFA results related to the variable "PU-O", another factor affecting the adoption of value-stream costing in lean enterprises, consisting of 6 variables are presented in table 9. According to the KMO value (0.903), it can be said that the sample is sufficient at an "excellent" level in terms of factor analysis. The Bartlett test ($\chi^2(15) = 218.295$; $p<0.05$) shows that the items in the scale are suitable for factor analysis and the data come from a multivariate normal distribution. The disclosure rate of the variance is 79.044%.

The EFA results of the scale "Perception of the factors affecting the adoption of value-stream costing in lean enterprises" in the questionnaire form are consistent with the results of the analysis carried out by Timm (2015).

4.6.2. Confirmatory Factor Analysis

Confirmatory factor analysis is used to confirm the factor structure of the observed variables when a previously used scale is reused in current research (Suhr, 2006; Hair et al., 2014). When testing the validity of a scale with CFA, it is recommended to use the Structural Equation Model (SEM) (Bülbül et al., 2012; Hair et al., 2014; Kaya, 2014; Da Costa, 2020, 83; Burak & Deniz, 2021). To perform CFA, no missing values are found in any observed variable data set. When the skewness and flatness values for the variables are examined, it is accepted that the values are in the range of "±1" and thus approach the normal distribution. Sample size is also one of the important issues in confirmatory factor analysis and the sample size of 217 participants in the study is considered sufficient for CFA (Wolf et al., 2013; Muthén & Muthén 2002).

The Structural Equation Model (SEM) is applied to test whether the structures related to the scale are verified ("maximum likelihood" is used as the parameter estimation method). However, as a result of testing the "Perspective on Traditional Accounting System Problems in the Lean Manufacturing Environment (TA) Scale", "The Perspective Towards the Changes Required by the Lean Manufacturing System (CHN) Scale" and the "Perspective on Performance Criteria (PERF) Scale" with CFA, it is concluded that the theoretical model did not comply with the data.

The results of the structural model through which the measurement model and the research hypotheses are tested, are interpreted by considering the generally accepted threshold values for fit goodness (Hair et al., 2014; Meydan & Şeşen, 2015; Akyüz, 2018). Hair et al. (2014) state that it is sufficient to use three or four fit indices as evidence to test model conformity. In this study, model compatibility is tested by means of CFA and through χ^2/df (Chi-square/Degrees of Freedom), GFI (Goodness Fit Index), CFI (Comparative Fit Index), TLI (Tucker–Lewis Index), RMSEA (Root Mean Square Error of Approximation) indexes which are mentioned in Hair et al., 2014 and Kline, 2019.

a) Confirmatory Factor Analysis of Value-Stream Costing Scale

The results of the single-factor model validated to determine the construct validity of the VSC scale are given in Figure 3. The basis of the model is that all observable variables are collected under an overarching supervariable. The values on the arrows from the implicit variables to the observed variables show the standardized load (path coefficients) of each of the observed variables on the factor.

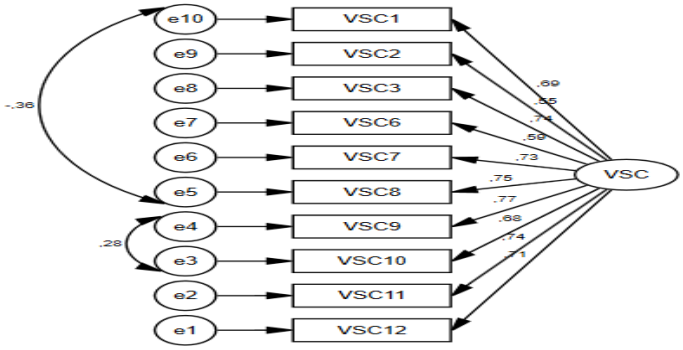

Figure 3. First-Level Single-Factor Model of VSC Scale

Kline (2019) stated that in the implementation of CFA, when the data is not consistent with the model, it is necessary to modify the model. If the model is modified, retesting is needed. Over the testing of the VSC scale with CFA, the modification indices given as program output were evaluated, and the goodness of fit index is corrected by matching the error term pairs with the highest value. As a result of the corrections made, the fit values obtained are shown in Table 10.

Table 10. CFA Results of VSC Scale

Scale	Fit Index	Values	Result
VSC Scale	χ^2/df	1,559	Good fit
	GFI	0,954	Good fit
	CFI	0,981	Good fit
	TLI	0,975	Good fit
	RMSEA	0,051	Acceptable fit

Chi-square value (χ^2=51.435; *df*=33; p= .000) is significant. According to the chi-square fit test (1,559), it is a perfect fit. The results of the analysis of variance with the estimation results show that all parameters are statistically significant (p<0.05).

b) Confirmatory Factor Analysis of the Scale of Use of Lean Cost Information in Decision-Making Processes

The standardized results showing the coefficients for the single-factor model verified for the purpose of determining the construct validity of the DMP scale are shown in Figure 4. The basis of the model is that all observable variables are collected under an overarching supervariable.

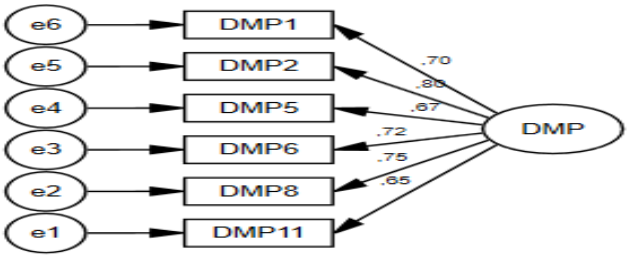

Figure 4. First Level Single Factor Model of DMP Scale

Table 11 contains the fit values obtained because of the CFA applied to determine the structural validity of the DMP scale.

Table 11. CFA Results of the DMP Scale

Scale	Fit Index	Values	Result
DMP Scale	$\chi 2/df$	2,333	Good fit
	GFI	0,968	Good fit
	CFI	0,976	Good fit
	TLI	0,961	Good fit
	RMSEA	0,079	Acceptable fit

Chi-square value ($\chi 2$=21.001; *df*=9; p= .000) is significant. The chi-square fit test result (2.333) appears to be a perfect fit also. The results of the analysis of variance with the estimation results show that all parameters are statistically significant ($p<0.01$).

c) Confirmatory Factor Analysis of Value-Stream Costing Adoption Scale

The standardized results showing the coefficients for the first-level multi-factor model validated to determine the structure validity of the scale of factors affecting adoption of VSC are given in Figure 5.

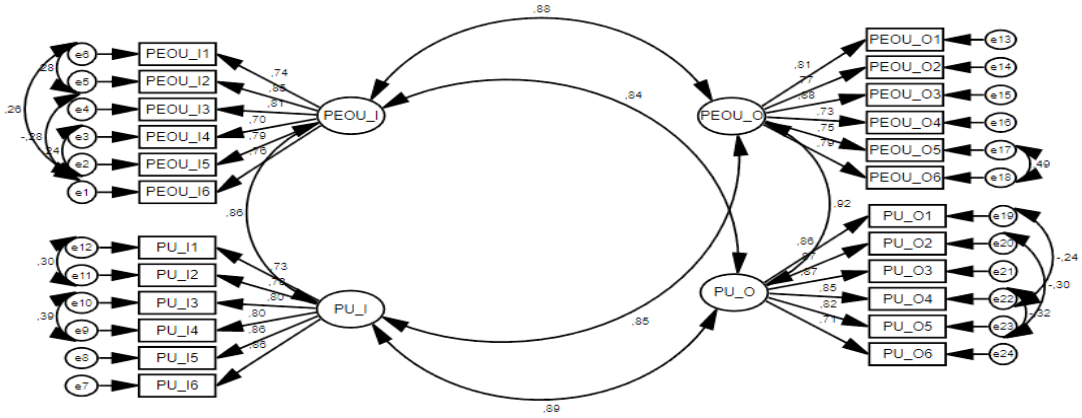

Figure 5. First-Level Multi-Factor Model of the VSC Adoption Scale

The basis of the model is that all observable variables are grouped under four overarching supervariables. According to Table 12, it can be concluded that the chi-square value ($\chi 2$=480.724; *df*=236; p= .000) is significant, and the chi-square fit test (2.037) is well compatible.

Table 12. Value-Stream Costing Adoption Scale CFA Results

Scale	Fit Index	Values	Result
VSC Adoption Scale	$\chi 2/df$	2,037	Good fit
	GFI	0,850	Acceptable fit
	CFI	0,946	Acceptable fit
	TLI	0,937	Acceptable fit
	RMSEA	0,069	Acceptable fit

The results of the analysis of variance with the estimation results show that the parameters are statistically significant ($p<0.01$). The values which belong to the GFI, CFI, TLI and RMSEA incompatibility index are acceptably compatible.

5. RESULTS

In this section, first, descriptive statistics related to lean enterprises are presented. In this context, the distributions of some demographic characteristics and the main variables are shown. Then, the results of the structural equation model applied to determine the effects of independent variables and intermediary variables on dependent variables are revealed.

5.1. Descriptive Statistics

Table 13 shows the frequencies and averages for some demographic characteristics of the enterprises participating in the research.

Table 13. Frequency Table for Some Demographic Characteristics of Enterprises (n=217)

		n	%			n	%
Fields of Activity	Production	204	94	***Sectors***	Automotive	80	31,1
	Service	13	6		Textile	23	8,9
					Electric-Electronics	7	2,7
Methods for Calculating Product Costs	Value stream costing	63	12,8		Chemical	8	3,1
	Work order costing	58	11,8		Machine-Metal	31	12,1
	Full costing	37	7,5		Iron and Steel	16	6,2
	Variable costing	32	6,5		Aviation	5	1,9
	Target costing	26	5,3		Health	4	1,6
	Activity-based costing	22	4,5		Energy	7	2,7
	Process costing	46	9,3		Building-Construction	10	3,9
	Backward costing	20	4,1		Consultancy	6	2,3
	Actual costing	56	11,4		Food-Agriculture	13	5,1
	Standard costing	70	14,2		Logistics	2	0,8
	Order costing	44	8,9		Plastic	12	4,7
	Phase costing	18	3,7		Furniture	14	5,4
					Other ……	19	7,5
Number of Distribution Keys Used for Overheads	One distribution switch	44	20,3	***Whether they know enough about VSC***	Yes	112	51,6
	Multiple distribution keys	173	79,7		No	105	48,4

Of the lean enterprises that participated in the research, 94% operate in the manufacturing sector and 6% in the service sector. According to the sectors in which they operate, automotive (31.1%), machinery-metal (12.1%) and textile (8.9%) sectors hold the top three ranks. However, most of the enterprises operate in more than one sector. According to the calculation method of product costs, 14.2% of the enterprises participating in the research use standard costing, 12.8% use value-stream costing and 11.8% use work order costing while some of the remaining enterprises use more than one method.

Cross-tabulations (intersection frequencies) to determine the relationship between lean enterprises using VSC and standard costing (SC), since some of the enterprises select more than one option, show that they use other costing methods along with VSC and SC methods. 29% of the enterprises participating in the research stated that they use VSC method. While the share of enterprises that use standard costing is 32.3%, the share of enterprises that use both methods is 6%.

While 79.7% of the enterprises use more than one distribution key for the distribution of overheads, 20.3% use one distribution key. In addition, while 51.6% of the enterprises had sufficient information about value-stream costing and accounting managers and staff, 48.4% stated that they did not have sufficient information about value-stream costing. 14.2% of the enterprises marked most of the changes in their accounting systems after the transition to lean manufacturing: "We reviewed the performance criteria, made additions and subtractions". 14% of the enterprises marked "We continuously eliminate waste from registration, reports and other accounting transactions" and 12.2% of the enterprises marked "We are more interested in the value created for the customer rather than in the past". The response with the lowest frequency (5.1%) is "There is no change".

Table 14 shows the frequencies and averages for the importance level of the purposes of usage of cost accounting data by the businesses participating in the research ("doesn't matter"=1, "very important"=5).

Table 14. Descriptive Statistics Regarding the Purposes of Using Cost Accounting Data

Purposes **(n=217)**	***1***		***2***		***3***		***4***		***5***		***mean***	***s.d.***
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**		
Finished product pricing	5	2.3	6	2.8	7	3.2	70	32.3	129	**59.4**	4.44	0.87
Cost management	3	1.4	3	1.4	8	3.7	76	35.0	127	**58.5**	4.48	0.76
Decision-making	6	2.8	4	1.8	28	12.9	90	**41.5**	89	41.0	4.16	0.92
Budgeting and controlling	2	0.9	3	1.4	18	8.3	79	36.4	115	**53.0**	4.39	0.78
Performance evaluation	6	2.8	15	6.9	28	12.9	90	**41.5**	78	35.9	4.01	1.01
Preparation of financial statements	2	0.9	11	5.1	14	6.5	80	36.9	110	**50.7**	4.31	0.87

According to Table 14, the use of cost accounting data for "cost management" purposes have the highest average importance (4.48).

Businesses that did not use standard costing in the questionnaire were asked to move on to the next question without answering the question in Table 15. However, although these enterprises do not use standard costing in calculating the cost of finished products, they can use it for other purposes listed in Table 15. Since 71.89% of the businesses that participated in the research continue to use standard costing, they responded to this question, while 28.11% did not.

Table 15. Descriptive Statistics on the Purposes for Using Standard Costing Method

Purposes (n=156)	*1*		*2*		*3*		*4*		*5*		*null*		*mean*	*s.d.*
	n	%	n	%	n	%	n	%	n	%	n	%		
Calculation of standard cost	3	1.4	5	2.3	13	6.0	63	29.0	72	**33.2**	61	28.1	4.26	0.89
Inventory valuation	7	3.2	4	1.8	17	7.8	58	26.7	72	**33.2**	59	27.2	4.16	1.02
Performance evaluation	7	3.2	11	5.1	30	13.8	52	24.0	57	**26.3**	60	27.6	3.90	1.11
Reduction of costs	3	1.4	6	2.8	15	6.9	42	19.4	90	**41.5**	61	28.1	4.35	0.94
Control of costs	2	0.9	5	2.3	12	5.5	50	23.0	89	**41.0**	59	27.2	4.39	0.86
Administrative control	3	1.4	4	1.8	22	10.1	57	26.3	70	**32.3**	61	28.1	4.20	0.91
Budget adjustment	2	0.9	9	4.1	25	11.5	51	23.5	70	**32.3**	60	27.6	4.13	0.97
Simplification of accounting records	7	3.2	9	4.1	39	18.0	53	**24.4**	47	21.7	62	28.6	3.80	1.08

According to Table 15, "control of costs", which is one of the purposes for using standard costing, has the highest average importance (4.39).

Table 16. Descriptive Statistics on the Importance of Factors for Businesses in the Improvement Process To Be Provided by Lean

Factors (n=217)	*1*		*2*		*3*		*4*		*5*		*mean*	*s.d.*
	n	%	n	%	n	%	n	%	n	%		
Capacity increase	1	0.5	5	2.3	14	6.5	86	39.6	111	**51.2**	4.39	0.75
Quality increase	0	0	1	0.5	7	3.2	58	26.7	151	**69.6**	4.65	0.57
Increased productivity	1	0.5	3	1.4	5	2.3	44	20.3	164	**75.6**	4.69	0.63
Stocks reduction	4	1.8	16	7.4	26	12.0	79	26.4	92	**42.4**	4.10	1.00
Cost reduction	2	0.9	2	0.9	10	4.6	55	25.3	148	**68.2**	4.59	0.71

Table 16 provides the importance level of the factors assessed by the enterprises in the improvement process that lean will provide to the businesses. The results show that the "productivity increase" factor has the highest average importance (4.69). Table 17 presents the factors that the enterprises attach importance to in terms of competition in the improvement process to be provided by lean. The table indicates that the "customer satisfaction" factor has the highest average importance (4.76).

Table 17. Descriptive Statistics on the Importance of the Competitive Factors in the Improvement Process To Be Provided by Lean

Competitive factors (n=217)	*1*		*2*		*3*		*4*		*5*		*mean*	*s.d.*
	n	%	n	%	n	%	n	%	n	%		
Quality	0	0	1	0.5	6	2.8	43	19.8	167	**77.0**	4.73	0.53
Price	0	0	2	0.9	13	6.0	61	28.1	141	**65.0**	4.57	0.65
Flexibility	3	1.4	7	3.2	21	9.7	88	40.6	98	**45.2**	4.25	0.86
Customer satisfaction	0	0	3	1.4	4	1.8	35	16.1	175	**80.6**	4.76	0.55
On time delivery	1	0.5	2	0.9	8	3.7	40	18.4	166	**76.5**	4.70	0.63
Innovation	3	1.4	7	3.2	26	12.0	64	29.5	117	**53.9**	4.31	0.90

Descriptive statistics of the main variables within the scope of the research are shown in Table 18. Accordingly, the variable "Perspective on the determination of performance criteria (PERF)" has the highest average importance of 4.42.

Table 18. Descriptive Statistics on the Main Variables

Main Variables	*mean*	*s.d.*
TA (Perspective on problems experienced in the traditional accounting systems)	3,3618	0,68594
CHN (Perspective on the changes required by the lean manufacturing system)	4,1820	0,70812
PERF (Perspective on the determination of performance measures)	**4,4230**	0,53196
VSC (Attitude towards value-stream costing)	4,0991	0,59309
DMP (Attitude towards the use of lean cost information in decision-making processes)	4,2151	0,59714
PEOU-I (Perceived ease of use for the individual)	4,1651	0,65890
PU-I (Perception of usefulness to the individual)	4,1367	0,67757
PEOU-O (Perceived ease of use for the organization)	4,0499	0,67219
PU-O (Perception of usefulness to the organization)	4,1313	0,67303
BI (Behavioral Intention to implement value-stream costing)	4,1700	0,78800

5.2. Findings Based on the Structural Equation Model

After determining that the measurement model (CFA) is statistically valid, the stage where the hypotheses will be tested is started. The relationships among all variables in the research model are considered. SEM is created to analyze the relationships among the variables and to test the hypotheses.

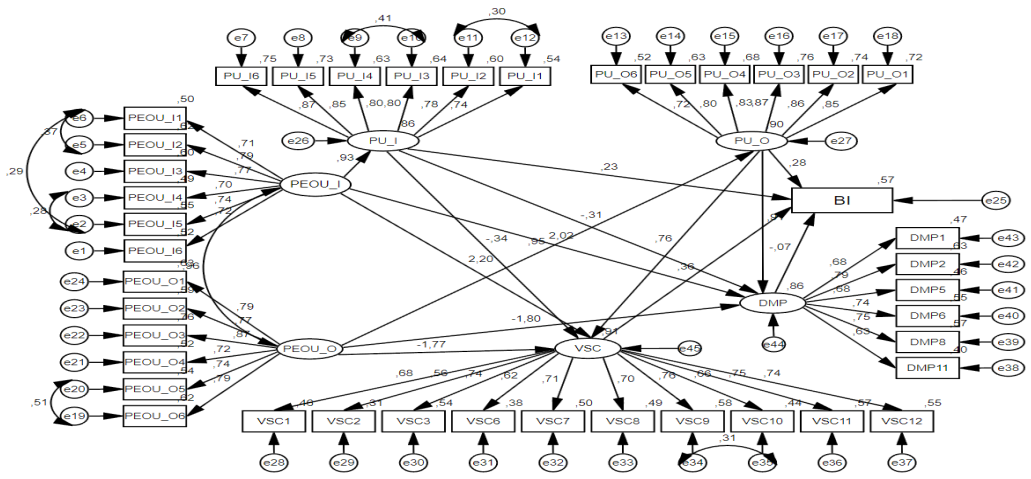

Figure 6. Results of the Proposed Structural Model

SEM for testing whether attitudes towards value-stream costing and the use of lean cost information in decision-making processes (DMP) and perceptions of factors affecting the adoption of value-stream costing (PEOU-I, PU-I, PEOU-O, PU-O) affect the value-stream costing intentions of enterprises and the findings drawn from the analysis are displayed in Figure 6. The structural model shown in Figure 6 consists of the PEOU-I and PEOU-O, which affect BI, and the PU-I and PU-O which act as a mediator of these relations, and the attitude variables towards VSC and DMP. To test the compatibility of the data with the model, the statistical validity of the structural model is examined through fit indices. The findings of the concordance indices are given in Table 19.

Table 19. Fit Indexes of the Structural Model

Fit Index	Values	Result
χ^2/df	1.954	Good fit
GFI	0.754	Weak fit
CFI	0.896	Weak fit
TLI	0.888	Weak fit
RMSEA	0.066	Acceptable fit

Table 19 shows that there is not sufficient harmony between the model and the data obtained from the model. When the findings obtained from the structural model are examined, the effect of PU-I perception on attitude towards VSC (β = -0.335; p = 0.096) and the effect of PU-I perception on attitude towards DMP (β = -0.315; p = 0.131) are not statistically significant. Furthermore, the effect of attitude towards DMP on the behavioral intention to apply value-stream costing (BI) (β = -0.070; p = 0.632) is not significant (p<0.05).

Accordingly, we decided to remove the attitude towards VSC and DMP from the model, considering the standardized regression coefficients, on the grounds that the perceived ease of use and usefulness did not fully mediate its effect on the intention as initially expected, and the model is re-specified.

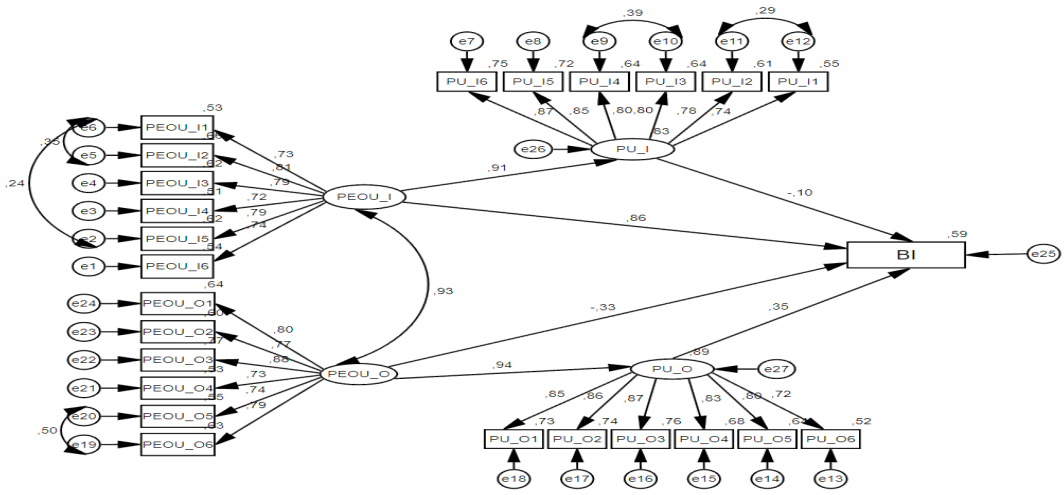

Figure 7. Results of the Revised Structural Model

The variables of the revised structural model in Figure 7 consist of PEOU-I and PEOU-O affecting BI, and PU-I and PU-O mediating these relations.

In Table 20, the findings for the statistical validity of the relationships defined in the revised research model are demonstrated. In line with this, the chi-square fit index value (χ2=592.740; *df* = 264; p = .000). is significant. The chi-square fit test result (592.740 / 264 = 2.245) shows that there is a "good fit" (χ^2/df < 3). The value of the RMSEA non-fit index indicates an "acceptable fit", while the CFI and TLI values indicate a "good fit". Although the GFI value is evaluated in the direction of a "weak fit", it is very close to the "acceptable fit" value.

Table 20. Fit Indices of the Revised Structural Model

Fit Index	Values	Result
χ^2/df	2.245	Good fit
GFI	0.829	Weak fit
CFI	0.930	Good fit
TLI	0.921	Good fit
RMSEA	0.076	Acceptable fit

Hypotheses regarding the validity of the relationships between the implicit variables of the model are analyzed by examining the findings on the relationships between the road coefficients in Figure 7 and the relationships in Table 21. In the light of these results, we investigate how a mediating variable would change the effects among the implicit variables, considering the direct effects as well as the indirect effects among the implicit variables.

Table 21. Relationships Between the Implicit Variables of the Model

Structural Relationships			C.R.	R^2	p	Standard Direct Effect	Standard Indirect Effect	Standard Total Effect
PU-I	->	BI	-0.599	0.593	0.549	-0.104	-	-0.104
PU-O	->	BI	1.561		0.119	0.352	-	0.352
PEOU-I	->	BI	2.841		0.004**	0.857	-0.127	0.762
PEOU-O	->	BI	-0.995		0.32	-0.334	0.414	-0.002
PEOU-I	->	PU-I	11.902	0.832	***	0.912	-	0.912
PEOU-O	->	PU-O	11.022	0.893	***	0.945	-	0.945

***p< 0.01; **p< 0.05

The findings show that PU-I has a negative effect on BI (β = -0.104) and is not statistically significant (p>0.05) and the influence of PU-O on BI (β = 0.352) is positive and not statistically significant (p>0.05). The results also indicate that PEOU-I has a positive effect on BI (β = 0.857) and is statistically significant (p<0.05). The effect of PEOU-O perception on BI (β = -0.334) is negative and not statistically significant (p>0.05). The PU-I, PU-O, PEOU-I and PEOU-O explain 59% of BI (R^2 = 0.593). PEOU-I has a positive effect on PU-I (β = 0.912) and is statistically significant (p<0.05) and it explains 83% of PU-I (R^2 = 0.832). PEOU-O has a positive effect on PU-O (β= 0.945), is statistically significant (p<0.05) and explains 89% of PU-O (R^2 = 0.893).

According to Table 21, only three effects are statistically significant. Accordingly, a direct influence is found only between the PEOU-I and PU-I and between PEOU-O and PU-O. Between the PEOU-I and BI variables, it is possible to talk about only an indirect effect. However, according to the results, one finding indicates that the effect of a variable that can be added between the PEOU-I / BI variables will be negative (-0.127) and therefore it will be in the direction of reducing the value of the effect. According to the SEM results, the **$H_{01.1}$, $H_{01.2}$** and **$H_{06.1}$** sub-hypotheses of the **H_{01}** and **H_{06}** hypotheses are not supported.

6. CONCLUSION AND DISCUSSION

In today's competitive environment where enterprises are struggling to survive, businesses that apply lean production to survive can use costing according to value-streams as a costing tool. Among these enterprises, the number of those using value-stream costing in calculating production costs, stock valuation and decision-making processes is quite small. Research conducted both in Turkey and in international literature indicates that studies are mostly focused on the lean thinking approach, lean production systems and tools. Since there are not enough studies focusing on lean accounting and value-stream costing, it is anticipated that this research will fill an important gap.

In this study, the effect of lean companies' attitudes towards value-stream costing (VSC) and their use of lean costing information in their decision-making processes (DMP) on their behavioral intention to apply value-stream costing (BI) is examined. Furthermore, the effect of their perceptions of the factors influencing the adoption of value-stream costing (PEOU-I, PU-I, PEOU-O, PU-O) on their behavioral intention to apply value-stream costing (BI) is explored. According to the SEM results used to determine the variables that can influence BI, we conclude that the model is sufficiently compatible with the data; and therefore, it is a statistically valid model. Results support hypotheses $\mathbf{H_{02}}$, $\mathbf{H_{03}}$, $\mathbf{H_{04}}$ and $\mathbf{H_{05}}$ and their sub-hypotheses. However, sub-hypotheses $\mathbf{H_{01.1}}$, $\mathbf{H_{01.2}}$ and $\mathbf{H_{06.1}}$ of hypotheses $\mathbf{H_{01}}$ and $\mathbf{H_{06}}$ are not supported. In his research, Timm (2015) determined that the perceptions of the participating enterprises towards the factors affecting the adoption of value-stream costing (PEOU-I, PU-I, PEOU-O, PU-O) positively affected BI and they were statistically significant. Chau and Hu (2001) tested TAM by adapting it to the health field and maintained that there is a statistically significant effect between attitude and BI. What's more, while PU is an important determinant of attitude and BI, it is found that PEOU had no meaningful effect on either attitude or BI. In the model revised by Venkatesh and Davis (1996) by removing the attitude variable from TAM, they found PEOU and PU to be the determinants of BI. They also found that PEOU had both a direct impact and an indirect impact through PU on BI. We conclude that the PEOU-I has a significant and direct positive effect on both BI and the PU-I. The findings are also consistent with the fact that PEOU-O only has a positive significant and direct effect on PU-O.

The results of this study are expected to guide the transformation of the accounting systems in the context of lean thinking, considering factors such as the implementation status of lean production, lean accounting and value-stream costing, and the design of organizations.

The results indicate that there is a behavioral intention to apply lean accounting and value-stream costing depending on the application of lean manufacturing systems in enterprises. However, However, the fact that the (positive) impact of operational development on financial results takes time makes businesses think about lean transformation. In the process of lean maturity journey, these enterprises

will be able to successfully compete by getting support from organizations that provide consultancy on this subject. One of the limitations of the research is that the scope is limited to businesses that receive consultancy and training services on lean management. Since it is possible that the variables within the scope of the research may vary over time, another limitation is that the findings obtained from the data collected by the questionnaire form are limited to the time when the research is applied.

This research is conducted in manufacturing enterprises, but lean manufacturing, lean accounting, and value-stream costing are not limited to manufacturing businesses. To survive in today's competitive environment, it is necessary for businesses to attach more importance to customer value, elimination of waste, continuous development, and to achieving excellence at all levels of the organization. Hence, more research on the application of lean manufacturing, lean accounting and value-stream costing in different sectors is encouraged.

ETHICS COMMITTEE APPROVAL

Approval is received by the decision of Osmaniye Korkut Ata University Scientific Research and Publication Ethics Committee dated 08.09.2020 and numbered 59754796-050.99/.

ETİK KURUL ONAYI

Osmaniye Korkut Ata Üniversitesi Bilimsel Araştırma ve Yayın Etiği Kurulu'nun 08.09.2020 tarih ve 59754796-050.99/ sayılı kararı ile onay alınmıştır.

AUTHORS' DECLARATION

This paper complies with Research and Publication Ethics, has no conflict of interest to declare, and has received no financial support.

YAZARLARIN BEYANI

Bu çalışmada, Araştırma ve Yayın etiğine uyulmuştur, çıkar çatışması bulunmamaktadır ve bu çalışma için finansal destek alınmamıştır.

AUTHORS' CONTRIBUTIONS

Conception/Design of Study- SMU, ZT; Drafting the Manuscript- SMU; Critical Revision of Manuscript- ZT; Final Approval and Accountability- ZT.

YAZARLARIN KATKILARI

Çalışma Konsepti/Tasarım- SMU, ZT; Yazı Taslağı- SMU; İçeriğin Eleştirel İncelemesi- ZT; Son Onay ve Sorumluluk- SMU, ZT.

REFERENCES

Abdullah, F. (2003). *Lean manufacturing tools and techniques in the process industry with a focus on steel*. Doctoral dissertation, University of Pittsburgh, Pennsylvania.

Aishah binti Awi, N. (2016). *The effect of lean kaizen application on student's satisfaction in Malaysian Higher Education Sector*. Unpublished doctoral dissertation, Coventry University, U.K.

Akinyode, B. F. (2016). The use of structural equation modeling (SEM) in built environment disciplines. *Research on Humanities and Social Sciences*, *6*(6), 109-120.

Aksoylu, S. (2014). Hastane işletmelerinde değer akış maliyetlemesi. *Niğde Üniversitesi İ.İ.B.F. Dergisi, 7*(1), 260-272.

Aktaş, R. (2013). Yalın üretim ortamında maliyet yönetimi: Değer akışı maliyetleme. *Selçuk Üniversitesi İktisadi ve İdari Bilimler Fakültesi Sosyal ve Ekonomik Araştırmalar Dergisi, 13*(25), 57-85.

Akyüz, H. E. (2018). Yapı geçerliliği için doğrulayıcı faktör analizi: Uygulamalı bir çalışma. *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi, 7*(2), 186-198.

Alpar, R. (2011). *Uygulamalı çok değişkenli istatistiksel yöntemler* (6. bs.). Ankara: Detay Yayıncılık.

Apilioğulları, L. (2018). *Yalın dönüşüm: Verimliliğin şifresi* (3. bs.). İstanbul: Agora Kitaplığı.

Arora, V. (2016). *Lean accounting: A case study of selected enterprises in India*. Doctoral dissertation, Mohanlal Sukhadia University, Udaipur.

Arslandere, M. (2017). *Yalın üretime geçiş çalışmaları; değer akış haritalama, bireysel öneri sistemi, kaizen çalışmaları: Büyük ölçekli firmalarda uygulamalar*. Doktora tezi, Selçuk Üniversitesi, Konya.

Ayçin, E. (2016). *Yalın üretim uygulamalarında israfın azaltılması ile performans ölçütleri arasındaki ilişkilerin ve etkileşimin analizi*. Doktora tezi, Dokuz Eylül Üniversitesi, İzmir.

Baggaley, B. (2003). Solving the standard costing problem, August, *http://www.nwlean.net/article0803.htm*. Erişim Tarihi: 05.04.2018

Barney H. and Kirby, S. N. (2004). Toyota production system/Lean manufacturing. B. Stecher & S. N. Kirby (Eds.), *Organizational İmprovement and Accountability: Lessons for Education from Other Sectors* (pp. 35-50). Santa Monica: RAND Corporation.

Burak, M. F. and Deniz, R. B. (2021). Kurum kültürü, sürdürülebilir rekabet avantajı, çevresel belirsizlik ve kurumsal performans ilişkisi: Türk ihracatçı firmaları. *International Journal of Arts & Social Studies (ASSTUDIES), 4*(6), 49-83.

Bülbül, H., Akın, M., Demirer, Ö. & Doğan, İ. C. (2012). Türk bankacılık sektöründe hizmet kalitesinin müşteri tatmini ve tekrar satın alma niyeti üzerine etkisi: Yapısal eşitlik modeli ile bir inceleme. *Doğuş Üniversitesi Dergisi, 13*(1), 28-40.

Büyükarıkan, U. (2021). Elma üretimi yapan bir tarım işletmesinde değer akış maliyetleme yöntemine göre örnek uygulama. *Alanya Akademik Bakış Dergisi*, *5*(1), 161-175. DOI: 10.29023/alanyaakademik.807959

Büyüköztürk, Ş., Çokluk, Ö. & Köklü, N. (2020). *Sosyal bilimler için istatistik* (23. bs.). Ankara: Pegem Akademi.

Carvalho, C. P. and Leite, L. E. (2021). Application of lean manufacturing to reduce unproductive times in a valve spring inspection and packaging cell. *International Journal of Advanced Engineering Research and Science (IJAERS), 8*(2), 305-323.

Cesaroni, F. M. and Sentuti, A. (2014, September 17-19). *Implementing a lean accounting system in a lean enterprise*. Proceedings of the 18th International Academy of Management and Business (IAMB) Conference, Rome.

Chau, P. Y. K. and Hu, P. J. H. (2001). Information technology acceptance by individual professionals: A model comparison approach. *Decision Sciences, 32*(4), 699-719.

Chen, J. C. and Cox, R. A. (2012). Value stream management for lean office-A case study. *American Journal of Industrial and Business Management*, *2*, 17-29. DOI:10.4236/ajibm.2012.22004

Chopra, A. (2013). Lean accounting-An emerging concept, *International Journal of Marketing, Financial Services & Management Research*, *2*(8), 79-84.

Civelek, M. E. (2018). *Yapısal eşitlik modellemesi metodolojisi*. (1. bs.). İstanbul: Beta Yayıncılık.

Da Costa, A. (2020). The application of structure equation modeling analysis for assessment and educational research. *The International Journal of Counseling and Education, September, 3*(3), 80-85.

Darabi, R., Moradi, R. & Toomari, U. (2012). Barriers to implementation of lean accounting in manufacturing companies. *International Journal of Business and Commerce, May, 1*(9), 38-51.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly,* 13(3), 3 19-339.

Davis, F. D., Bagozzi, R. P. & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982-1003.

Deflorin, P. and Scherrer-Rathje, M. (2012). Challenges in the transformation to lean production from different manufacturing-process choices: A path-dependent perspective. *International Journal of Production Research, 50*(14), 3956-3973.

Deran, A. and Beller, B. (2014). Hastanelerde yalın yönetimin bir aracı olarak değer akış maliyetleme ve kamu hastanesinde bir uygulama. *Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 32*, 161-174.

Durmuşoğlu, B. (2020). *Yalın dönüşüm yolculuğu: Dönüşüm olası mı? Yoksa bir hayal mi?* İstanbul: Optimist Yayın.

Dursun, Y. and Kocagöz, E. (2010). Yapısal eşitlik modellemesi ve regresyon: Karşılaştırmalı bir analiz. *Erciyes Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 35*(Ocak-Temmuz*)*, 1-17.

Duque D. F. M. and Cadavid, L. R. (2007). Lean manufacturing measurement: the relationship between lean activities and lean metrics. *Estudios Gerenciales*, *23*(105), 69-83.

Ertuğrul, İ., Özveri, O. & Gündoğan, A. (2013). Yalın üretim sisteminin tekstil sanayinde uygulanabilirliği. *Kafkas Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 4*(6), 15-32.

Fritzell, I. and Göransson, G. (2012). *Value stream mapping in product development: Adapting value stream mapping at ascom wireless solutions*. Master's thesis, Chalmers University of Technology, Gothenburg.

Fullerton, R. R. and Kennedy, F. A. (2010, August). *Modeling a management accounting system for lean manufacturing firms*. Paper Presented at The Annual Meeting of The American Accounting Association, San Francisco, CA. DOI: 10.2139/ssrn.1445703

Goldratt, E. M. (2009). Standing on the shoulders of giants – Production concepts versus production applications The Hitachi tool engineering example. *Gest. Prod., São Carlos, 16*(3), 333-343.

Grasso, L., Tyson, T., Skousen, C. & Fullerton, R. (2015). Lean practices: A field study. *Cost Management, January/February*, 14-24.

Gürbüz, S. (2021). *AMOS ile yapısal eşitlik modellemesi, temel ilkeler ve uygulamalı analizler* (Güncellenmiş 2. bs.). Ankara: Seçkin Yayıncılık.

Hair Jr., J. F., Black, W. C., Babin, B. J. & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). USA: Pearson Education Limited.

Kaldırım, Y. and Kaldırım, Z. (2018). Değer akış maliyet yönteminin yalın üretim sistemindeki yeri ve önemi üzerine bir inceleme. *İşletme Araştırmaları Dergisi, 10*(4), 520-535.

Karcıoğlu, R. and Nuray, M. (2010). Yeni bir maliyetleme yöntemi olarak değer akışı maliyetleme. *Muhasebe ve Finansman Dergisi, 47*, 69-80.

Katko, N. (2019). *Yalın CFO, Yalın yönetim sisteminin mimarisi* (T. Sancı, Çev.). İstanbul: Optimist Yayın. (Orijinal baskı, 2014).

Kaya, A. and Hatunoğlu, Z. (2020). Değer akış maliyetleme ve analitik hiyerarşi süreci: Tekstil sektöründe bir uygulama. *Akademik Araştırmalar ve Çalışmalar Dergisi, 12*(23), 358-381.

Kaya, Ş. (2014). *Yapısal eşitlik modellemesi: Baş dönmesi, kaygı ve bedensel duyumları abartma ilişkisi*. Doktora Tezi, Uludağ Üniversitesi, Bursa.

Kefe, İ. and Berikol, B. Z. (2019). Yalın üretim sistemi ve muhasebeye etkileri. *Mali Çözüm Dergisi, 29*(151), 13-31.

Kennedy, F. A. and Brewer, P. C. (2005). Lean accounting: What's it all about? *Strategic Finance, 87*(5), 27-34.

Kennedy, F. A. and Brewer, P. C. (2006). The lean enterprise and traditional accounting – Is the honeymoon over? *The Journal Of Corporate Accounting & Finance*, *17*(6), 63-74

Kennedy, F. A. and Widener, S. K. (2008). A control framework: Insights from evidence on lean accounting. *Management Accounting Research, 19*, 301-323.

Kennedy, F. A., Widener, S. K. & Fullerton, R. (2010). Accounting for a lean environment (15 Ağustos 2010*). AAA 2011 Management Accounting Section (MAS) Meeting Paper*. http://dx.doi.org/10.2139/ssrn.1659386 Erişim Tarihi: 07.10.2021.

Keskin, A. İ. (2010). *Cost management system in lean enterprises: Lean accounting*. Doktora Tezi, Marmara Üniversitesi, İstanbul.

Kline, R. B. (2019). *Yapısal eşitlik modellemesinin ilkeleri ve uygulaması* (S. Şen, Çev. Ed.). Ankara: Nobel Yayıncılık. (Orijinal baskı, 2016)

Li, X. (2014). *A literature review on value stream mapping with a case study of applying value stream mapping on research process*. Master's thesis, Texas A&M University, Goteborg.

Lindholm, S. (2018). *Value stream mapping for prefabricated piping in projects*. Master's thesis, University of Vaasa, Vaasa.

Maskell, B. H. and Baggaley, B. (2006). Lean accounting: What's it all about? *Target Volume, 22*(1), 35-43.

Maskell, B. H., Baggaley, B. & Grasso, L. (2011). *Practical lean accounting: A proven system for measuring ve managing the lean enterprise*, New York: Taylor&Francis Group.

Maskell, B. and Katko, N. (2007). Value stream costing: The lean solution to standard costing complexity and waste. Joe Stenzel (Eds.), *Lean Accounting Best Practices for Sustainable Integration* (pp. 155-176). New Jersey: John Wiley&Sons.

Maskell, B. H. and Kennedy, F. A. (2007). Why do we need lean accounting ve how does it work? *The Journal of Corporate Accounting & Finance, March/April*, 59-73.

Mathieson, K. (1991). Predicting user intention: Comparing the technology acceptance model with theory of planned behavior. *Information Systems Research, 2*(3), 173-191.

Maynard, R. (2007). Count on lean, quality World. March 2007, http://www.ideas2action.co.uk/wp-content/uploads/2013/10/qw-maynard_march07.pdf. Erişim Tarihi: 06.10.2019.

Melsas, R. (2018). *Research and development of improved value stream mapping methodology for evaluation of demand side management possibilities in the industry sector*. Doctoral dissertation, Tallinn University of Technology, Estonia.

Meydan, C. H. and Şeşen, H. (2015). *Yapısal eşitlik modellemesi AMOS uygulamaları* (2. bs.). Ankara: Detay Yayıncılık.

Muthén, L. K. and Muthén, B. O. (2002). How to use a monte carlo study to decide on sample size and determine power. *Structural Equation Modeling, 9*(4), 599-620.

Naing, L. Winn, T. and Rusli, B. N. (2006). Practical issues in calculating the sample size for prevalence studies. *Archives of Orofacial Sciences*, 1, 9-14.

Ocak, M. (2020). *AMOS ile adım adım yapısal eşitlik modeli uygulamaları* (1. bs.). Bursa: Ekin Yayınevi.

Ofileanu, D. (2016). *Implementation of lean accounting in the footwear industry*. Doctoral dissertation, University of Alba Iulia, Alba Iulia.

Ofileanu, D. (2015). Aspects regarding the application of lean accounting in taking the managerial decisions. *"Ovidius" University Annals, Economic Sciences Series*, *15*(1), 941-944.

Okpala, K. E. (2013). Lean accounting and lean business philosophy in Nigeria: An exploratory research. *International Journal of Economics, Finance and Management, 2*(7), 508-515.

Onat, O. K. (2012). *Yalın maliyet yönetimi yaklaşımı ve bir üretim işletmesi uygulaması*. Doktora Tezi, Süleyman Demirel Üniversitesi, Isparta.

Özçelik, F. (2011). *Yalın üretim uygulayan işletmeler için muhasebe sistemi*. Doktora Tezi, Uludağ Üniversitesi, Bursa.

Özçelik, F. and Ertürk, H. (2010). Yalın üretim işletmeleri için değer akış yönetimi ve değer akış maliyetlemesi. *Uludağ Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 29*(2),* 51-84

Pech, M. and Vaněček, D. (2018). Methods of lean production to improve quality in manufacturing. *Quality Innovation Prosperity / Kvalita Inovácia Prosperita 22*(2), 1-15.

Rao, M. H. S. and Bargerstock, A. (2011). Exploring the role of standard costing in lean manufacturing enterprises: A structuration theory approach. *Management Accounting Quarterly, 12*(1), 47-60.

Ruiz-de-Arbulo-Lopez, P., Fortuny-Santos, J. & Cuatrecasas-Arbós, L. (2013). Lean manufacturing: Costing the value stream. *Industrial Management & Data Systems*, *113*(5), 647-668.

Shah, R. and Ward, P. T. (2003). Lean manufacturing: Context, practice bundles, and performance. *Journal of Operations Management,* 21, 129-149.

Suhr, D. D. (2006). Exploratory or confirmatory factor analysis? *Statistics and Data Analysis, Cary: SAS Institute*, 1-17.

Tabachnick, B. G. and Fidel, L. S. (2020). *Çok değişkenli istatistiklerin kullanımı* (M. Baloğlu, Çev. Ed.). Ankara: Nobel Yayıncılık. (6. Basımdan Çeviri).

Tancı Yıldırım, N. (2020). *Yalın muhasebe ve yalın (değer akışı) maliyetleme: Türkiye'de yalın üretim sistemini uygulayan işletmeler üzerine bir araştırma*. Doktora Tezi, Osmaniye Korkut Ata Üniversitesi, Osmaniye.

Taylor, S., and Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(1), 144- 176.

Timm, P. (2015). *Perceptions of value stream costing and the effect on lean-accounting implementation*. Unpublished doctoral dissertation, Walden University, Washington.

Tüfekçi, N. and Tüfekçi, Ö. K. (2006). Bankacılık sektöründe farklı olma üstünlüğünün ve müşteri sadakatinin yarattığı değer: Isparta ilinde bir uygulama. *Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 2*(4), 170-183.

Türk, Z. & Çeviren, S. M. (2018). Yalın üretim ortamında yalın muhasebe ve yalın performans değerlemesi. *Osmaniye Korkuta Ata Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 2*(2), 221-245.

Türk, Z. and Uluç, S. M., (2022). Değer akışı maliyetleme ve karar verme süreci: Bir sanayi işletmesinde uygulama. N. Akdoğan, D. U. Doğan & Ö. Sezgin Alp (Eds.), *Maliyet ve Yönetim Muhasebesinde Güncel Konular* (ss. 65-91). Ankara: Gazi Kitabevi.

Venkatesh, V. (1999). Creation of favorable user perceptions: Exploring the role of intrinsic motivation. *MIS Quarterly, 23*(2), 239-260.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research, 11*(4), 342-365.

Venkatesh, V. & Davis, F. D. (1996). A model of the perceived ease of use: Development and test. *Decision Sciences, 27*(3), 451-481.

Venkatesh, V. and Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal studies. *Management Science, 46*(2), 186-204.

Venkatesh V. and Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 24(l), 115-137.

Wolf, E. J., Harrington, K. M., Clark, S. L. & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educ. Psychol. Meas, December, 76*(6), 913-934.