Lägg gärna till din organisations logotyp.

Slutrapport

Vad betyder Lean för lantbruksföretagen

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Utförlig sammanfattning

Svenskt lantbruk har under senare tid karaktäriserats av svag lönsamhet och konkurrenskraft. En pågående strukturrationalisering ökar kraven på lantbrukarens förmåga att leda och koordinera resurser. Lean är en företagsledningsmetodik som ursprungligen utvecklades i efterkrigstidens Japan. I Sverige bedrivs för närvarande Lean lantbruk, en satsning med syfte att implementera Lean i lantbruks- och trädgårdsföretag. I andra sektorer såväl internationellt som nationellt har Lean visat sig medföra betydande förbättringar i flera ekonomiska nyckeltal.

Syftet med projektet är att utvärdera vad Lean betyder för lantbruksföretagen vad gäller lönsamhet, resursutnyttjande samt vilka faktorer som ger förutsättningar för framgångsrik implementering av Lean. En justerad räkenskapsanalys av affärsredovisningen utgör data vilka sedan jämförs med referensföretag i den Jordbruksekonomiska Undersökningen (JEU). Studien tillämpar ekonometriska och icke-parametriska metoder för att analysera lönsamhet och resursutnyttjande. Frågor rörande implementering analyseras med kvalitativ metodik. Analysen avser tidsperioden 2008-2015. Studien speglar perioden innan företagen gick med i Lean lantbruk och efter det att Leanprogrammet inleddes. Totalt analyseras 55 företag under en period om 4-6 år. Sammantaget kan noteras att skillnaderna i trendmässig förändring av nyckeltal mellan perioden före och efter Lean är relativt begränsade för Leanföretagen visavi referensföretagen. Leanföretagen kännetecknas av stigande soliditet över tiden, högre kapitalomsättningshastighet, ökande fritt kassaflöde samt en något högre tillväxttakt mätt i omsättning och antal arbetade timmar. Samtliga dessa nyckeltal indikerar förbättrade förutsättningar för en framtida gynnsam utveckling av Leanföretagen.

De kvantitativa analyserna tyder på att resursutnyttjandet kan förbättras med ca 3,3 procentenheter och företagens vinstmarginal kan förbättras med ca 3,0 procentenheter. De kvalitativa studierna, baserade på djupintervjuer, visar tydligt att företagsledaren i kombination med coach/rådgivare är centrala för framgångsrik introduktion av Lean. Studien visar att Lean har en potential i svenskt lantbruk men för att denna skall kunna nyttjas fullt ut krävs en ökad satsning på integrerad rådgivning.

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1. Introduction

1.1 Background

Lean is a philosophy and a business strategy with effective methods for organization and management of firms. It was developed in post-war Japan which at the time experienced an extreme scarcity of resources which was particularly noticeable in the industry (Liker, 2004). Lean production is, narrowly defined, a collection of methods for streamlining production of goods and services. Some argue for a wider definition where Lean is regarded as a culture with a holistic approach to resource-optimizing corporate governance (Dyrendahl and Granath, 2011). A key feature is long-term continuous improvements that lead to dedicated employees that minimize the waste of resources. In addition, there is an emphasis on activities that add value to the final products.

There exists an extensive literature dealing with various aspects of lean (for a review see Stone, 2012) and Lean has had a substantial impact in the manufacturing industry but also in other sectors such as in healthcare. Olsson and Hellsmark (2012) evaluated the implementation of lean in small and medium-sized industrial firms in Sweden. They showed that firms four years after adopting Lean that adopted showed substantial improvements in most measurable financial ratios concerning compared to reference firms. A review of the literature reveals that studies of Lean applied to agricultural business activities are scarce. Some method development work regarding the introduction of Lean into Swedish agricultural firms has been conducted but economic evaluation is lacking (Dyrendahl och Granath, 2011). Given this background, the question arises if the introduction of Lean in Swedish agriculture may result in similar effects as in industrial firms.

The importance of enhancing competitiveness in Swedish agriculture was recently articulated in a report commissioned by the Swedish government (Regeringskansliet, 2015). The project Lean Lantbruk (Lean agriculture) is a first attempt to implement Lean in order to improve the competitiveness of the agricultural sector. At the same time, recent Swedish research shows that precisely the organization of the firm and the management capacity appear to have significant impacts on differences in technical and economic efficiency between farms (Larsén, 2010).

1.2 Objectives of the study

Given the issues raised in the introduction, the following research questions are formulated:

1) What the differences in economic performance and /or operational results can be demonstrated for Swedish agricultural firms as a result of introduction of Lean?

2) How is resource efficiency (technical efficiency) affected by the introduction of Lean? What activities lead to the most substantial improvements and what are the implications for key financial ratios?

3) In what ways is the behavior of management affected by the introduction of Lean? What factors contribute to a successful implementation of Lean?

2. Theoretical and methodological foundations

2.1 Theoretical foundations

To understand the mindset of Lean we refer to the 14 principles of Lean presented by Liker (2004) in his seminal work "The Toyota way". The principles are designed to guide firms in both short and long-term operations.

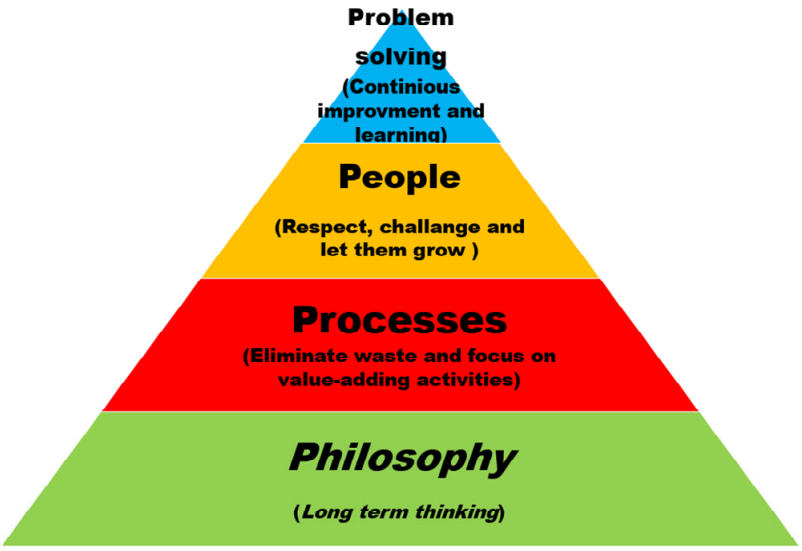

Figure 1. The Philosophy behind Lean. Source: Liker (2004)

Lean provides guidance for the development of the processes, as well as the people who develop the processes. If problems arise, it is important to solve the problems quickly and in the way planned with the goal of avoiding errors. The data required to answer question 1 and 2 are based on traditional microeconomic theory. Consider a situation where one unit of a product Y is produced using a resource X:

P_Y : Effective product price per unit of product Y

P_X : Effective price per unit of resource X

APP_X: Average physical productivity of factor X

Total profits of the firm $\prod$ assuming constant returns to scale is given by:

$$\prod = Y(P_Y - P_X / APP_X) \quad (1)$$

Profit margin (PM) is defined by:

$$PM = (P_Y - P_X / APP_X)/P_Y \quad (2)$$

Equation (1) is typically what is defined by the earnings statement for a specific firm. Given equation (1) several key financial ratios can be evaluated, for example gross margin, profit margin (Olsson and Hellsmark, 2012). The profit margin (eq. 2) and a multitude of financial ratios are closely linked to the 14 principles of lean. Product price is for example closely linked to principle 5 that discusses product quality. Furthermore, product prices and factor prices are linked to principles 3 and 11 that stress the importance of satisfying consumer demand and maintain effective networks among customers as well as suppliers. Most of the other principles are linked to the concept of factor productivity, i.e. APP_X

2.2 Empirical approach

In order to address question 1, a comparative analysis of farms adopting Lean and firms that have not introduced Lean was conducted. Data is based on measurements of production, resource consumption and profitability based on adjusted financial accounting procedures (Ånebrink, 1985).

In addition, we adopt an econometric based approach in order to examine how the implementation of Lean affects the economic performance of agricultural firms, specifically we estimate different specifications of fixed effects models, focusing on before and after the introduction of Lean.

In the empirical analysis addressing question 2), i.e. to examine the implications for resource efficiency (technical efficiency) of implementing Lean, we use Data Envelopment Analysis (Coelli et al., 2005). This non- parametric method analyzes differences in technical and size-dependent efficiency between firms before and after the introduction of Lean. These differences provide a basis for analyzing to which extent technology, management and decision-making systems as defined by Lean have affected the economic performance.

2.3 Data collection

The data set originates from the project Lean Lantbruk. Data was collected for 2008-2015 and was mainly carried out by students at SLU during the summers of 2014-2016. By 2015, approximately 100 agricultural firms had participated in Lean Lantbruk. These firms were contacted concerning potential participation in this study. At the initial stage, all firms received information about the project, including expected benefits of participating as well as what information they needed to provide if they chose to participate. Subsequently, the firms were contacted by telephone in order to supplement the mail inquiry. Each manager/owner was informed that they would receive a financial report on the performance of their own farm. The firms are often owned or leased by one or more individuals as a proprietary firm, limited liability firm or both. Region, firm structure and size in the study served as the basis for classification of agricultural firms in accordance with Swedish type classification (Statistics Sweden, 2013).

Firms that chose to participate provided financial data, in the form of balance sheets and earnings statements, from 3 years prior to implementing Lean and until 2015. This makes it possible to examine differences in financial and/or economic results due to the introduction of Lean. A complete financial analysis where asset values are adjusted to market value as opposed to acquisition values in the traditional accounting system in accordance with the principles applied in the course "Farm Management and Medium-Run Planning, FÖ0373" at SLU. If the firm operates a proprietary firm in combination with a limited firm a consolidated earnings statement and balance sheet is constructed in accordance with traditional accounting principles. The same principles were applied by Dyrendahl and Granath (2011) in order to examine a potential change in financial ratios due to the introduction of Lean

Furthermore, data on a control group of firms that did not participate in Lean Lantbruk was collected from the Agricultural Economic Survey (Statistics Sweden, 2011-2017). The features of the control group are more extensively described in Andersson et. al. (2019).

3. Results

3.1 Financial ratios- analysis of accounting system

The purpose of the project is to examine how Lean affects the economic performance of agricultural firms. We evaluate the differences in key financial ratios and analyze the profitability of agricultural firms.

The results are intended to reflect the period before the firms joined Lean Lantbruk and after the start of the Lean training program. The agricultural and horticultural firms joined Lean project in different years and therefore the time period for each farm depends on when Lean was implemented.

A comparison is made between reference firms and Lean firms, before and after implementation. The reference firms refer to the Swedish agricultural firms participating in the Agricultural Economics Survey during the same period. The firms that implement Lean tend to be larger than the average sized agricultural firms that continuously make investments. The average profit margin, i.e. profits, net of imputed cost on owners labour, is slightly higher for the Lean firms. Despite this, the average profit margin for the different farm types such as milk, pigs, poultry and meat is negative. Nursery farms and crop farms display the highest profit margin, where crop farms represent the most profitable businesses. The trends for several key ratios are presented in the table below.

In general the trend in stock turnover and equity ratio show a more positive trend for Lean firms than for the reference farms. All categories of farms display patterns of firm growth but key profitability measures such as profit margin and return on total assets do not display an increasing trend. It is, based on the analysis of accounting ratios, difficult to draw any distinct conclusions concerning the impact of Lean. Olsson and Hellsmark

(2012) were able to draw more affirmative conclusions but the manufacturing firms did not face the same level of price and production risk as the farms.

Key financial ratios	Lean before implementation	Lean after implementation	Reference farms
Turnover			
Turnover/hour			
Number of hours worked			
Stock turnover			
Profit margin			
Equity ratio			
Return on total capital			
Cash flow			
Support payments/turnover			

3.2 Econometric approach

Andersson et al. (2019) show that different financial ratios and performance measures vary substantially across firms and time. Hence, it is important to choose a model that can control for factors that are different across farms but constant over time as well as for factors that are constant across farms but change over time. It is noticeable that financial ratios such as profit margin and return on total assets vary considerably. In addition, the rate of return on total capital as well as the profit margin, are found to be quite low. The focus was set on what measures are likely to be affected given that the 14 principles are introduced in accordance with Liker (2004). This approach is supported by a study of farm survival in the 1990´s by Franks (1998). He found that gross margin and revenues played a major role including terms of trade as measured by price developments. Price volatility during the period of 2008-2015 also contributes towards substantial volatility in some of the key financial ratios. In addition, the study by Andersson et.al. (2019) points out that these ratios tend to be positively correlated with farm size. Given the above, the following econometric specification are proposed.

$$Ln\left(y_{jt}\right) = \alpha_0 + \alpha_{0j} + \alpha_{0t} + \alpha_1 Ln\left(TA_{jt}\right) + \alpha_2 LEAN_{jt} + \varepsilon_{jt} \qquad (3)$$

The dependent variable, y_{jt}, in equation (3) is either revenues or gross margin, for farm j at a given year t. α_{0j} and α_{0t} are farm and time fixed effects, respectively. TA_{jt} is the total assets deflated with consumer price index. $LEAN_{jt}$ is the variable of interest that assumes the value 1 if the farm have implemented Lean and 0 otherwise. Revenues are

highly affected by volatility in product prices between 2008 and 2015. In order to adjust for price volatility, total revenues and gross margin are deflated with firm specific weighted indices based on thirteen different revenue groups. This procedure emphasizes the development of productivity, which is an essential feature in many of the 14 principles.

Equation (3) is estimated i) with only farm fixed effects, ii) with farm and time fixed effects and, iii) with only farm fixed effects and an added linear time trend. With revenues as the dependent variable implementation of Lean has a positive and statistically significant effect (at 1%). The fixed effects in i) and ii) are statistically significant. Introducing either time fixed effects or a linear time-trend, yield conflicting results. Surry and Meilke (1982) argue that diverse influences cannot be adequately captured by a simple time trend. It is also important to note that the implementation of Lean variable is correlated with time since Lean emerges in the latter years of the period studied and thereby represents parts of a trend.

With gross margin as the dependent variable the parameter estimate of the Lean variable is positive in i) indicating that the introduction of Lean on average would increase the gross margin by approximately 390 000 SEK. This would imply an increase of 0.7 percentage points in return on total assets and an increase in the profit margin by 2.9 percentage points. However, the Lean variable is not statistically significant. In fact, the variable of interest is not statistically significant in any of i)- iii). This may be due to a short sample period and the heterogeneity of farm types. However, this does not necessarily mean that there are no effects of Lean on individual farms. Dyrendahl and Granath (2011) conducted a case study on three different farm types. After identifying potential improvements they found that the return on total assets could increase by 1.5 percentage points on average by entering lean.

3.3 Data envelopment analysis

The objective of this section is to analyze technical efficiency of agricultural firms before and after the introduction of Lean. We use data envelopment analysis (DEA), which is a non-parametric method (Coelli et al 2005). Measurements of production, resource consumption and profitability are based on an adjusted accounting analysis. Consequently, the influencing factors are product and factor prices, technology as well as economic behavior reflected through management and information systems. The method allows analyses of differences in technical, economic and size-dependent efficiency between firms before and after the introduction of Lean. The model is based on Coelli et al (2005) where efficiency indices are computed for each farm and each year by solving a minimization problem. The objective function measures the radial efficiency score which ranges between 1 and 0, where 1 indicates the most efficient farms. The decision making units are the individual farms. The inputs included in the model are crop and livestock cost, labor cost, capital cost, other costs and tillable land. In our estimation we only use one output, namely, revenues. A detailed description of how these production factors are computed, given some adjustments based on the data from the analyses of the accounting system, is provided in Andersson et.al. (2019).

36 farms display a complete set of data for six years (2010-2015). The explanation for fewer farms here than in the econometric approach is that some farmers did not supply the accounting data for the entire period. Total revenues were, as in the econometric estimation, deflated with a firm specific weighted index. The cost of each of the four inputs were deflated with the corresponding input price index.

The average efficiency score for farms that have adopted lean is 0.882 and for farms prior to adopting lean it is 0.849. This indicates that farms that have implemented Lean on average have a higher efficiency score than those that have not yet done so. The difference between the two averages are 0.033 and a two-sampled t-test with equal variance indicates that the difference is statistically significant (at 5%). Given the input oriented approach, the interpretation is that factor use, which is equivalent to costs, on average can be reduced by 3.3 percentage points, holding output constant at the level prior to entering Lean. On average the total costs for inputs amount to 11128000 SEK for the total sample. The average tillable land for the same sample is 266 hectares. Therefore, total cost savings amount to approximately 0.033*11128000 + 0.033*266*2044 = 385166. This implies that firms entering Lean, based on the total sample average, can keep revenues constant and reduce costs by approximately 385000 SEK. Return on total assets may improve with 0.86 percentage points and profit margin may increase with around 3.0 percentage points.

3.4 Implementation of Lean

A crucial aspect pertains to the critical factors for introducing Lean (Achanga et.al. 2004). A study was conducted within the framework of research question 3 (Andersson and Andersson, 2014). The study analyzes how the farm operator can apply the Lean method to develop leadership by evaluating indicators revealing the potential to develop Lean leadership. The study uses a qualitative method with case studies of agricultural firms, where firm managers, employees and coaches have been interviewed.

The study shows that the farmer/manager must constantly work with Lean in the day-to-day operations to maintain and implement Lean on Swedish farms in the long term. Lean must be an integral part of the organization and the corporate culture. It is important to work step by step with continuous improvements, establish a meeting structure and arrange inspiring events such as study visits and education. An external Lean coach may also be able to follow up and maintain the continuity of Lean work. Lean leadership promotes improvements in terms of work environment, work structure, motivation and communication. Important attributes of a successful leader implementing Lean are to be clear, transparent and have the ability to delegate and formulate the firm's vision.

Environmental awareness is growing among the public and in the agricultural sector. In the context of the research question 3 is a study of Lean and its effects on Swedish farms environmental strategies (Samuelsson and Strid, 2015). The study analyzes the basis of a management perspective on how Lean affects strategies regarding climate efficiency in Swedish agriculture. Based on four different types of environmental strategies eight farms that participated in the Lean project were compared with eight reference farms that did not take part in the project. The study reveals that farms that

have implemented Lean to a greater extent focus on routines in the work processes compared to the reference firms. Lean firms therefore apply an environmental strategy that leads to both reduced costs and more effective resource use, which reduces climate impact. A reduction in climate impact due to resource savings is a bonus of Lean. Interestingly, Lean farms differ in their approach to interest organizations with environmental focus (NGO´s). Those who have implemented Lean tend to have a more relaxed attitude towards NGO´s.

Another study was conducted within the aim of research question 3 (Johnsson and Weidman, 2016). The question was to what extent Lean affects collaboration between farmers/partners where one of them is part of the Lean project and the other one is not part of Lean. The question is addressed in terms of the implications for business culture and supply chain collaboration. The 4P model according to Liker (2004) served as the theoretical foundation where philosophy, process, people and partners and finally problem solving are fundamental elements. A qualitative approach was used where three cases were examined. One of the partners applied Lean and the other one did not. The study found a high level of trust among all the collaborative arrangements irrespective of to what extent Lean management was part of the arrangement. Lean did not appear to play a vital role. The study found that not in any case had the partners adopted Lean management principles to a major extent. The authors argued that Lean has the potential to improve collaborative arrangements if the 4 P model is fully embraced by the partners.

4. Conclusions

The results indicate differences in the development of certain key financial ratios, for example a more positive trend in terms of solvency and the rate of stock turnover, between firms that implement Lean and reference firms that do not implement Lean. All categories of farms display patterns of firm growth but key profitability measures such as profit margin and return on total assets do not display an increasing trend.

The results from the econometric approach show both positive and negative impact on revenues and gross margin, depending on whether time is included in the model or not. However, for the majority of the specifications the coefficient is not statistically significant. The mixed results can be explained by the large variation between firms and the limited time period investigated.

The results from the DEA displays cost savings of approximately 3.0 percentage points, which amounts to 385 000 SEK of cost savings calculated on the total sample average. Hence, it can be concluded that firms that implement Lean tend to use their resources more efficiently.

The main results from studies relating to question 3 is that it is of utmost importance to continuously work in accordance with the 4 P model. The success of Lean ultimately hinges upon persistency and accuracy which is well reflected by Liker (2004)

5. Recommendations and implications for the agricultural sector

The results have several important implications. It is noteworthy to observe that biological processes pose an additional challenge when implementing Lean. It is quite clear that economic results /financial ratios varies substantially between farms and over time. Consequently, the agricultural sector is more complex than manufacturing industry. The qualitatively oriented studies all point towards the importance of the manager and the ability to communicate the fundamental principles of Lean. Furthermore, recruitment of staff and the ability to develop these individuals over time, being fully aware of the biological nature of production, is another decisive factor. This is a well known fact for large scale farms where the future success of their operations is crucially dependent on successful recruitment. The study reveals that Lean may be an effective tool to manage that process in a more structured manner.

The point estimates in the econometric estimation indicates a potential for improvements around 0,7 % on the return on total assets and around 2,9 percentage units of the profit margin. The results are however not statistically significant which can be explained by the large heterogeneity between farms and the short time period in this study. The results of the DEA does however show that farms implementing Lean are more resource efficient, producing the same output at lower costs, hence implicitly improve profits with around 385 000 SEK. To put this figure in perspective it can be contrasted to an empirical analysis of large sets of farm level data from LRF-konsult over a similar time period. This analysis indicates that the differences between the upper and lower quartile in terms of earnings before depreciation and financial costs typically amount to around 400- 500 000 SEK every single year irrespective of typology of farm. This finding is quite similar to the results in this study. Hence, the results obtained in this study suggest that efforts ought to be taken to develop integrated advisory services. Large size agricultural operations are becoming increasingly complex. Hence, it is vital to find a functional bridge between specialized experts in crop management, livestock production and economics and finance. Properly implemented Lean may have the potential to serve as “a bridge over troubled waters”.

6. References

Achanga, P., Shehab, E., Roy, R., Nelder, G. 2005. Critical success factors for Lean implementation within SMEs. Cranfield: Department of Enterprise Integration, Cranfield University.Cranfield.

Andersson, C and Andersson, H. 2014. Lean leadership- The Toyota way in agricultural firms. Mastes’s thesis, Agriculture Programme- Economics and Management No 879, SLU, Uppsala.

Andersson, C. Andersson, H., Andersson, H, Bååth Jacobsson, S., Firglad, D., Hoffman, R., Johnsson, C., Kallin, K., Karlsson, O., Merza, S., Mossberg, E., Persson, P, Rehnholm, Remvig, S., Samuelsson, M., Svensson, H., och Åkerberg, C. 2019. Vad betyder Lean för lantbruksföretagen?- En ekonomisk utvärdering av Lean lantbruk för perioden 2011-2015. Rapport , 69 s. + bilagor, HS Halland, Halmstad och SLU, Uppsala (under publicering som rapport och kan erhållas på begäran)

Coelli. T. J. Prasada Rao D. S., O'Donnell C. and Battese G. (2005). An introduction to Efficiency and Productivity Analysis: Second Edition. Heidelberg: Second edition

Dyrendahl, C., Granath, J. 2011. Lean för lantbruksföretag- utvärdering av industriellt managementsystem i agrar kontext. Exam thesis Nr 642, SLU, Uppsala.

Franks, J.R. 1998. Predicting financial stress in farm businesses. *European Review of Agricultural Economics*, 25(1), 30–52.

Johnsson,C. and Weidman, E. 2016. Effects of adopting Lean Management within collaborating firms- a qualitative study of Lean Lantbruk in a Swedish context. Master's thesis, Agriculture Programme- Economics and Management no. 1023, SLU, Uppsala

Larsén, K. 2010. Effects on machinery- sharing arrangements on farm efficency: evidence from Sweden. *Agricultural Economics* 45(5), 497-506.

Liker, J. K. 2004. *The Toyota Way - 14 Management Principles from the World's greatest Manufacturer,* McGraw-Hill: New York.

Merza, S., Andersson,H. , Hoffman, R., Surry, Y., Bååth Jacobsson, S., Karlsson, K. and Åkerberg C. 2019. Economics effects of introducing Lean in Swedish agriculture. Working paper (forthcoming) 30p. Department of Economics, SLU

Olsson, M., Hellsmark, H. 2012. Effektutvärdering av produktionslyftet Fas 1:2007-2010. Vinnova. *Borås.*

Regeringskansliet. 2015. Attraktiv, innovativ och hållbar- strategi för en konkurrenskraftig jordbruks- och trädgårdsnäring., SOU 2015:15. Stockholm.

Samuelsson,M. och Strid,V. 2015. Green Lean: The effects on environmental strategies in Swedish agricultural firms. Master's thesis, Agriculture Programme- Economics and Management no. 957, SLU, Uppsala.

Stone, K.B. 2012. Four decades of lean: a systematic literature review. *International Journal of Lean Six Sigma*, 3(2), 112-132.

Surry, Y. and Meilke, K.D. 1982 Incorporating Technological Change in the Demand for Formula Feed in France. *American Journal of Agricultural Economics*, May: 254-259.

Ånebrink, I. 1985. Räkenskapsanalys i lantbruksföretag-teorigenomgång och praktikhandledning. Nr 249 Uppsala: Sveriges lantbruksuniversitet, Institutionen för ekonomi och statistik.

Statistics Sweden,

2017. Jordbruksekonomiska undersökningen 2015 Slutlig Statistik. JO40 SM 1701.

2015. Jordbruksekonomiska undersökningen 2013 Slutlig Statistik. JO40 SM 1501.

2013. Jordbruksekonomiska undersökningen 2011 Slutlig Statistik. JO40 SM 1301.

2011. Jordbruksekonomiska undersökningen 2009 Slutlig Statistik. JO40 SM 1101.

Resultatförmedling

Ange resultatförmedling av projektet, inklusive titel, referens, datum, författare/talare, och länk till presentation eller publikation om tillämpligt. Planerade publiceringar (med preliminära titlar) ska ingå i tabellen. Ytterligare rader kan läggas till i tabellen.

Vetenskapliga publiceringar	Ove Karlsson, Christine Andersson, Hanna Andersson, Hans Andersson, Susanne Bååth Jacobsson, Carl Johnsson, Martin Melin, Fredrik Rehnholm, Malin Samuelsson and Claes Åkerberg. 2017. Lean Agriculture- Lean implementation Program- Part of Strategic Farm Management Program in Sweden. In Seminar Proceedings from 21st International Farm Management Congress, Edinburgh, Scotland, 2nd – 7th July 2017 (non peer reviewed) p 65-77. https://ifmaonline.org /wp-ontent/uploads/2018/03/ESMS_2_EntrepreneurshipStrategicManagement_seminar_Booklet.pdf
Övriga publiceringar	Andersson, C. Andersson, H., Andersson, H, Bååth Jacobsson, S., Johnsson, C.,Karlsson, O., Rehnholm, F., Samuelsson, M. och Åkerberg, C. 2015. Vad betyder Lean för lantbruksföretagen?- En ekonomisk utvärdering av Lean lantbruk. Rapport , 57 s. + bilagor, HS Halland, Halmstad. http://www.leanlantbruk.se/?p=27976
	Andersson, C. Andersson, H., Andersson, H, Bååth Jacobsson, S., Firglad, D., Hoffman, R., Johnsson, C., Kallin, K., Karlsson, O., Merza, S., Mossberg, E., Persson, P, Rehnholm, Remvig, S., Samuelsson, M., Svensson, H., och Åkerberg, C. 2019. Vad betyder Lean för lantbruksföretagen?- En ekonomisk utvärdering av Lean lantbruk för perioden 2011-2015. Rapport , 69 s. + bilagor, HS Halland, Halmstad och SLU, Uppsala (under publicering som rapport)
	Merza, S., Andersson,H. , Hoffman, R., Surry, Y., Bååth Jacobsson, S., Karlsson, K. and Åkerberg C. 2019. Economics effects of introducing Lean in Swedish agriculture. Working paper (forthcoming) 30p. Department of Economics, SLU

Muntlig kommunikation	Christine Andersson och Hanna Andersson. ”Vad kan Lean medföra i svenskt lantbruk? Presentation vid Mjölkföretagardagen, Umeå, 2015- 01-28. H. Andersson, Föredrag vid SLA Årsstämma med Hans Reich och Hanna Åström, 2015-04-15
	Lean utgör del av föreläsningar i ”företagsledning” inom kursen FÖ0373 för agronomekonomer, SLU, 2015 -2020, H. Andersson
	Lean utgör del av föreläsningar i den externa kursen ”Strategisk företagsledning”, KCF, SLU Alnarp januari 2020, H. Andersson
Studentarbete	Andersson, C and Andersson, H. 2014. 2014. Lean leadership- The Toyota way in agricultural firms. Mastes’s thesis, Agriculture Programme- Economics and Management No 879, SLU, Uppsala
	Samuelsson,M. and Strid,V. 2015. Green Lean: The effects on environmental strategies in Swedish agricultural firms. Master’s thesis, Agriculture Programme- Economics and Management no. 957, SLU, Uppsala
	Johnsson,C. and Weidman, E. 2016. Effects of adopting Lean Management within collaborating firms- a qualitative study of Lean Lantbruk in a Swedish context. Master’s thesis, Agriculture Programme- Economics and Management no. 1023, SLU, Uppsala
	Lundberg, A. och Persson,E. 2016. Lean i lantbruket- En studie av svenska mjölkproducenters strategiarbete i södra Sverige. Examensarbete, 15 hp, Agronomprogrammet ekonomi, nr 1009, SLU, Uppsala.
Övrigt	Intervjuer i fackpress: Agronomen, Nr 4, 2014; Jordnära, Nr 4, 2014; SLAbladet, Nr 4, 2014; Lantmannen, Nr 47, 2015.
	Möte med referensgruppen: ”Vad betyder Lean för lantbruksföretagen?” 11/6, 2015, Lilla Böslid, Halmstad. Kallade: D. Carlsson, Chalmers (ej närv.), Jonas Fjertorp, Jordbruksverket,Emma Frödå, Danske Bank (ej närv.) Jimmy Larsson LRF-konsult