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Exploring the Decline of the Marikina Shoe Industry using a System Dynamics Model

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Abstract

It has been argued in recent years that globalization and trade liberalization has had negative effects on the sustainability of local industries. Within this context and industrial dynamics, this study focuses on the decline of the Marikina shoe industry. A System Dynamics simulation model is built to explore and examine the feedback loops that caused the decline. The results showed that business profitability is the central feedback loop that reinforces the declining trend. Finally, the study tests the two measures - promotion and marketing projects and industry impact projects- that have been initiated by the Marikina Shoe Industry Development Office (MASIDO) to revive and support the industry. The resulting simulation suggests the key to competing with the Chinese products is through control of costs and the improvement in quality. Finally, implementing training as an industry impact project alone led to more improvement in the decline of firms than marketing activities alone. However, by implementing the two measures simultaneously, the declining trend slowed down. But the trend was reversed only when a higher impact from both training and marketing was tested.

Keywords: *Marikina Shoe Industry, effects on sustainability, globalization*

Introduction

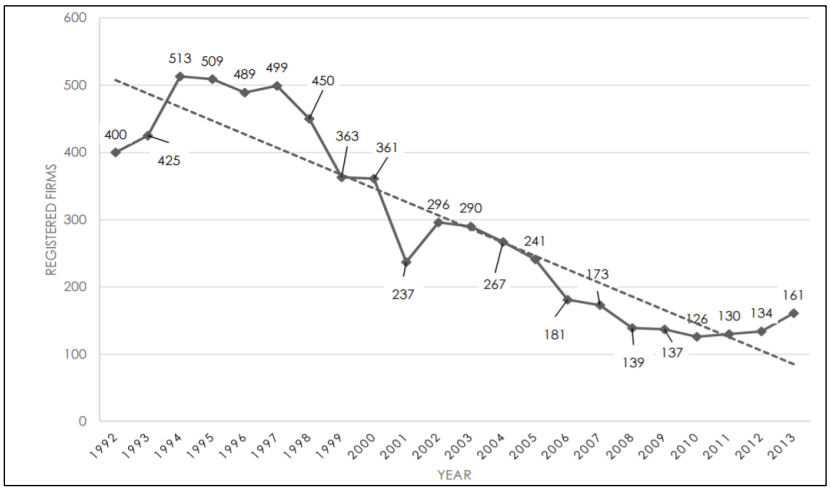
Globalization and trade liberalization's many benefits to the world economy have been highlighted in literature but deeper analysis of these positive effects had been undertaken in the 2000s. Shopina, et al (2017) noted that recent years did not see the expected consistent growth and development from globalization. They further observed that "economic growth practically does not exist" and that since the mid-1960s, the pace of economic growth has steadily declined. Tanchuco (2005) also pointed out that globalization has led to more poverty from the displacement of industries and suggested that "higher trade participation has always required greater emphasis on efficiency and specialization; failure to compete in the market means decline". The decline of the Philippine footwear industry is cited as a case of the adverse effect of trade liberalization.

The city of Marikina earned a reputation as being the center of shoe manufacturing in the Philippines as early as 1956 (de la Cruz and Juanson, 2017) when it was called the "shoe capital of the Philippines". However, the shoemaking industry began as early as 1887 when Don Laureano "Kapitan Moy" Guevara introduced and encouraged shoemaking. The success of the business encouraged the involvement of Marikenos in the industry. By 1935, the town had 139 shops producing 260,078 pairs of ladies' shoes and 86,692 pairs of men shoes worth Php 762,896.00, and as many as 2,450 citizens were directly engaged in the industry as shoemakers (Tanchuco, 2005).

However, the end of World War II opened the Philippine market to foreign goods including leather goods which were raw materials for the shoe industry and shoes which directly competed with Marikina products. In the 1970s and the 1980s, the Philippine footwear industry was able to capitalize on the US fashion trend as it exported snake-skin shoes to New York and other big US cities (Scott, 2005). Globalization in the 1990s further increased the unrestricted entry of branded products. Later, cheaper Chinese products directly competed with Marikina shoes not only in the domestic market but also in the export markets (Moral, 2013). Scott (2005, p. 87) observed that the Philippine shoe industry was "being undermined not only with direct competition in the final market but also by a troubling downturn in the local input supply-base as manufacturers turn more and more to other countries (again, predominantly China) for their leather, synthetics, accessories".

Data on the registered shoe manufacturers in Marikina from 1992 to 2013 reflected this downward trend (Machuca, et al, 2014).

Figure 1
Number of registered shoe manufacturers in Marikina (from Machuca, et al, 2014)



The current concern of the Marikina City government is improving and supporting its shoe industry. The Marikina Shoe Industry Development Office (MASIDO) was established "to promote, enhance, institutionalize & spearhead the full development of the Footwear & Leathergoods Industry". The Office is tasked with designing and implementing strategies, programs, and other measures towards the development of the industry (MASIDO website).

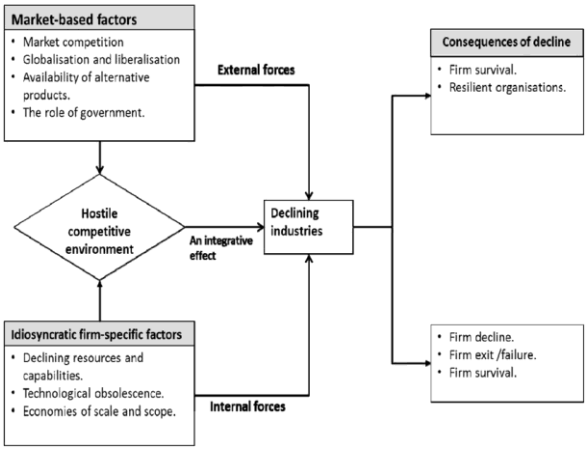
This paper explores and analyzes the decline of the Marikina shoe industry as well as the measures adopted by MASIDO for its industry using a simulation model. A theoretical System Dynamics model is built that approximately replicates the past performance of the industry. The causes of the decline are examined as they interact within their feedback loops. The measures taken by MASIDO are introduced into the model and the results are observed and analyzed. This research intends to understand the problems of the Marikina shoe industry from a feedback perspective (of System Dynamics) and to project into the future the effects of the efforts of MASIDO. This study, thus, contributes to the industrial dynamics research field.

Literature Review

Industrial dynamics is the study of the drivers of the evolution of industries (Krafft, 2002) as it examines the variables critical to the processes of entry and exit of members of the industry, innovation, and growth within the firms and to understand their evolution over time. He points out that "industrial dynamics is crucial for understanding the coherence that exists within a specific industry" as involves "patterns, puzzles, and anomalies".

Gorth and Klepper (1982) suggest that the industrial life cycle of growth and decline is characterized by a series of stages: first, there is the entry of a few firms, followed by a positive net entry. In the third stage, the entry rates equal the exit rates, and from there, there is a negative net entry rate and finally, there is stability in the number of firms. Amankwah-Amoah (2015) proposed that internally, declining industries have declining resources and capabilities, technological obsolescence, and problems with economies of scale. Externally, these declining industries are affected by market competition, globalization, and trade liberalization, and the role of the government (Figure 2).

Figure 2
Amankwah-Amoah (2015) framework for the decline of industries



More specific to the Marikina shoe industry, de la Cruz and Juanson (2017) identified five main issues: competition with China, low demand, dependence on Imported Raw Materials, and Location of Firms. Machuca et al (2014) quantified the factors affecting the decision by the show manufacturer to stop operations with the competition with foreign products including Chinese products at 90% followed by low demand and decreasing or negative profit both at 70%. The almost exponential growth of Chinese footwear imports from 1996 and valued at almost $180,000 in 2015 (de la Cruz and Juanson, 2017) suggests that the local show manufacturers are facing stiff competition in the domestic market. Similarly, export values have also declined. China-made shoes are competitive in both the local and international (Scott, 2005) because of their prices and not necessarily their quality. Moral (2013) noted that producing in the Philippines has become more expensive. In particular, Tanchuco (2005) observed that the Philippine value added in shoe production is low compared to other countries which he interprets as opportunity losses.

The Marikina Shoe Industry Development Office is an alliance of shoe manufacturers that aims to adopt and mobilize strategies "to fuel sales and rejuvenate local shoe production" (Bayaton-Obispo, 2015). The MASIDO adopted two general intervention thrusts – marketing and promotion projects and industry impact projects (MASIDO website). Scott (2005) noted some of the activities that contributed to these two thrusts. The marketing and promotion activities with the aim of "broadening and deepening" export markets included hosting the Asian Footwear Conference and representation and attendance at international shoe trade fairs. On the other hand, the industry impact projects involved training courses related to shoe production such as management, manual operations, and design to address the industry weaknesses on low technological intensity and skills shortages.

In his review of industrial dynamics models, Krafft (2002) explains that a set of evolutionary models focuses on the history of the industry and elaborates on the longitudinal data. He concludes that it is a fruitful perspective as it focuses on the internal conditions that affect choices and decisions within the firm which allows a bigger picture of the competitive forces in the industry. Malerba et al (1999) suggest that "history-friendly modeling" is dedicated to integrating what analysts and empirical researchers believe and think what is happening, "their arguments presenting their causal explanations of the observed pattern of economic phenomena".

The present study, following the System Dynamics methodology (Sterman, 2000), is consistent with the evolutionary models described by Krafft (2002). The System Dynamics approach proposes that observed historical data patterns result from the interactions of factors and variables that form feedback loops. The variables with the loops either reinforce each other (positive feedback loops) or control each other (negative feedback loops). Feedback loops also blur the difference between cause and effect variables. (Senge, 1990) Over time, the interactions and interdependencies of the variables will lead to complex time paths of increases and decreases.

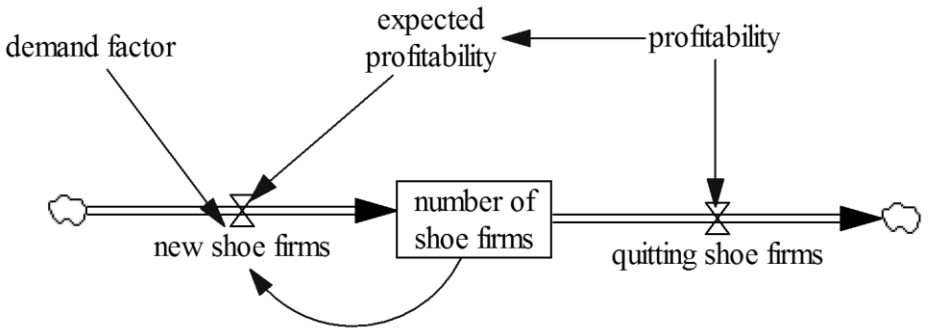
In this methodology, the interactions between variables are modeled using generic differential equations that are run on a computer simulation package. The results of the simulation are presented in graphical and tabular forms for any variable within the model. As such, the causal variables can be analyzed and interpreted. Moreover, the methodology allows for changing or extending simulation length and thereby indicating the future system behavior that is not yet observed in the present system.

Specifically, the initial simulation run of the model, referred to as the base run, is compared with the historical data in Figure 1, referred to as the reference mode The relative similarity between the base run and the reference mode indicates confidence that the model can represent the real system (Sterman, 2000). To explore the causes of the system behavior or the path followed by both the reference model and base run, the other variables in the system are plotted and studied to find their contribution to the main variable, in this case, the number of shoe firms. The extension of the simulation run shoes the tendency of the system behavior in the future. Finally, the interventions suggested in the system (by MASIDO) are similarly modeled by identifying variables and their interactions and their connection to the original system. The intervention is implemented into the system and the resulting behavior is observed in the simulation.

The Model

The number of shoemakers generally follow the basic model of Mutuc (2017) based on newly organized shoe manufacturers and those that quit the business. Quitting the business is directed by the profitability factor while new businesses are affected indirectly through their estimated profitability. The basic structure also allows for imitation. As there are more shoe firms, there will also be more new firms. Similarly, quitting firms are affected by the current number of firms in the industry. This is shown in Figure 3 below.

Figure 3
Basic structure of the Marikina shoe industry



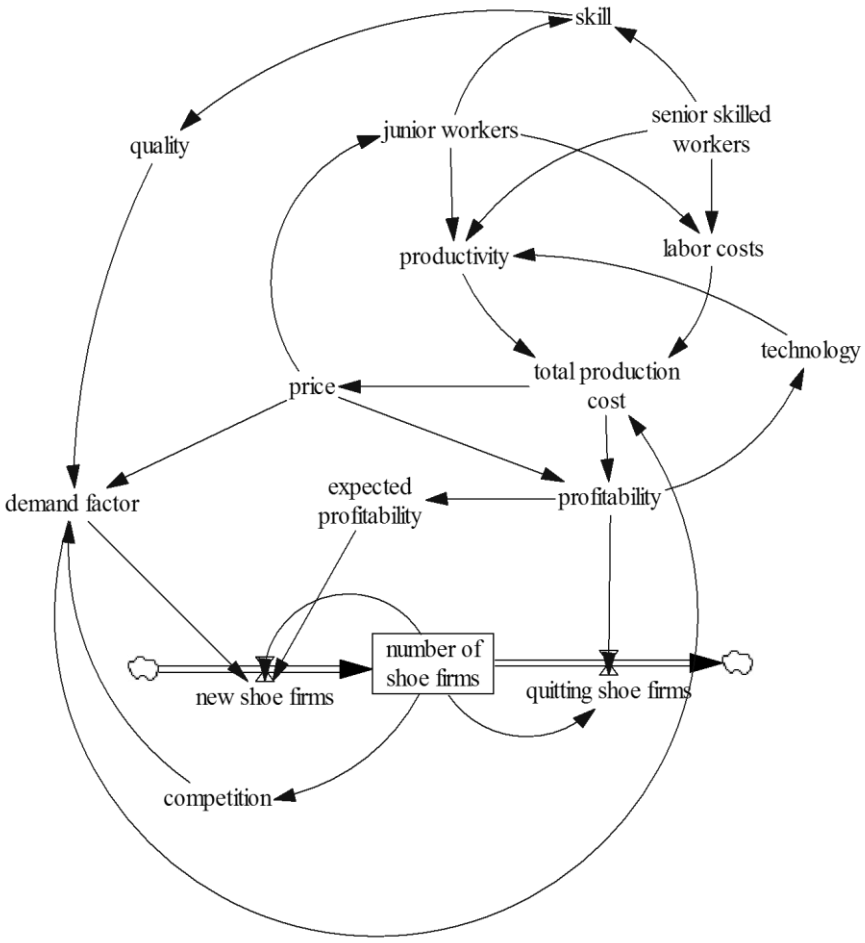
The feedback loops that control the industry are mostly connected to profitability mainly through cost. First, the cost is determined by total production cost which is related to labor cost and productivity. Labor cost is a function of years and skill of workers with new younger inexperienced workers being paid less than their senior counterparts. Thus, a company with more senior skilled workers will have relatively higher labor costs than one whose manpower has a bigger proportion of new less-skilled workers. However, when the company is less profitable, it is not encouraged to expand its manpower and will not hire new workers. A low proportion of "cheaper" workers will lead to a higher total labor cost.

The second feedback loop involves skills that follow a similar argument. In this case, the total skill level of the firm is improving as fewer less-experienced workers are hired and the manpower is dominated by senior experienced workers. The higher the skill level of the firm, the higher its productivity, eventually contributed to reduced costs and higher profitability. Moreover, the skill level also improves product quality.

Taken together, higher product quality and lower costs increase demand. Increased demand has two effects. First, it increases the volume of orders which contributes to lower total manufacturing costs. Second, it feeds back into new businesses. However, more firms lead to more competition that eventually leads to a lower volume of orders for the firm.

Another important feedback loop deals with technology. The willingness to invest is affected by the profitability of the firm. As it becomes more profitable, it is more open to buying equipment, which improves its productivity and eventually contributing to lower costs. These feedback loops are shown in Figure 4.

Figure 4
Feedback system of the Marikina shoe industry



Results and Tests

The base result of the simulation is shown in Figure 5. The red line represents the actual data derived from Figure 1 and the blue line shows the simulated plot, representing the interaction of the factors discussed earlier. The initial run of the simulation model shows consistency with the actual historical data.

Figure 5
Simulated vs actual data (Line 1: number of shoe firms; Line 2: Actual number of shoe firms.)

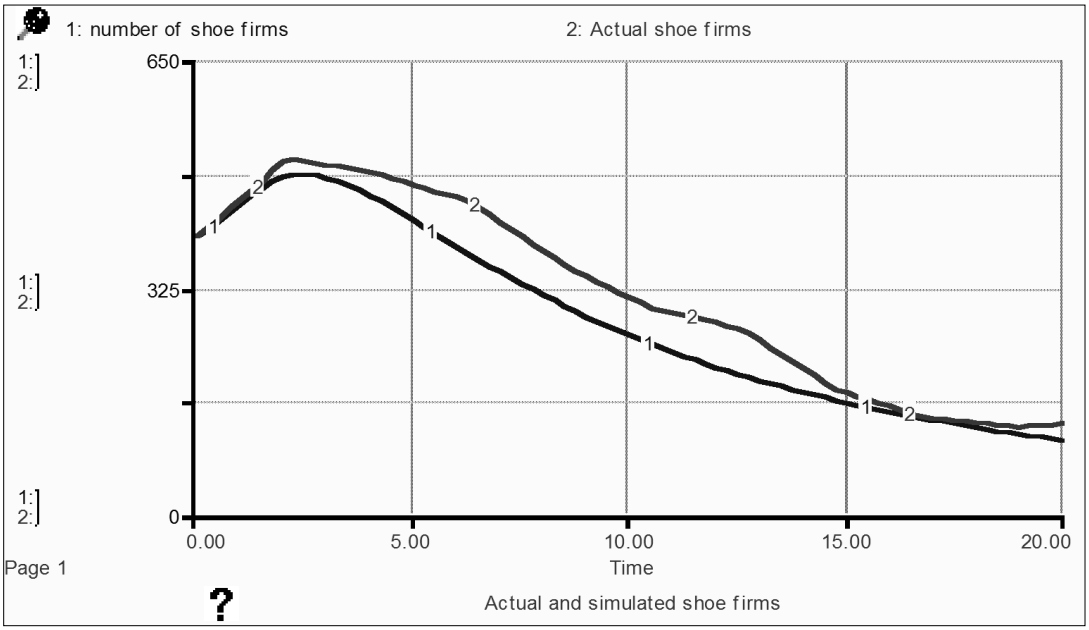
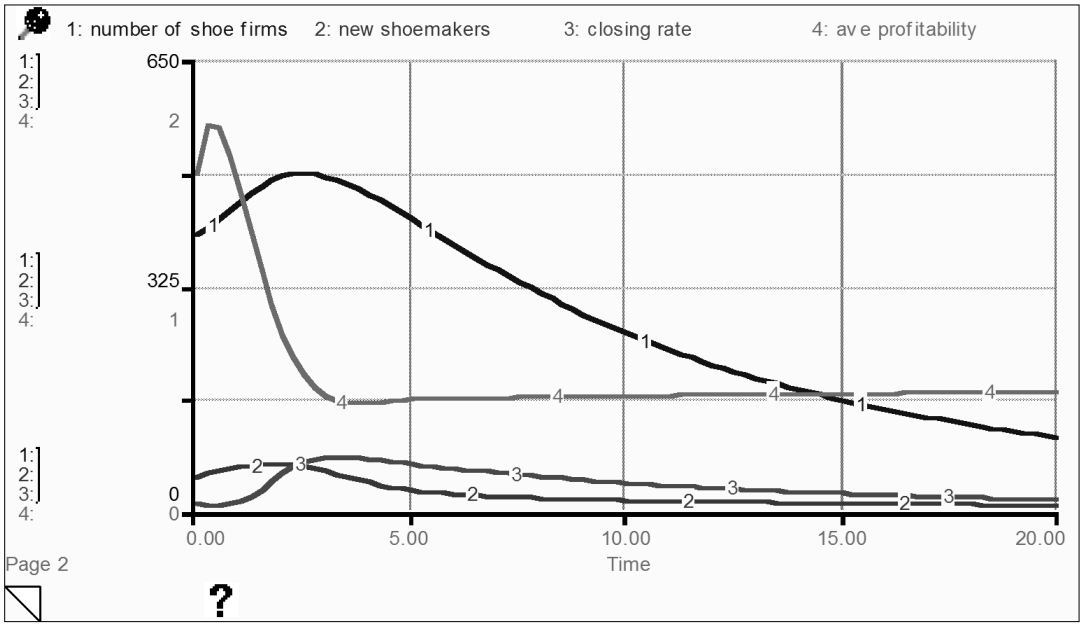


Figure 6
Direct factors to number of shoe firms (Line 1: number of shoe firms; Line 2: new shoe firms; Line 3: shoe firms closing; Line 4: average profitability)



There is an initial increase in the number of shoe manufacturers (Line 1 in Figure 5) because of the perceived profitability of the business, mainly due to its largely profitable history (Line 4 in Figure 6). Subsequently, profitability declines and induces more firms to close (Line 3) than to open (Line 2), leading to a negative net change to the number of shoe firms.

Profitability (Line 4 in Figure 6) goes down because its costs (Line 1 in Figure 7) are increasing due to higher labor costs (Line 2 in Figure 7) owing to its manpower being dominated by "expensive" experienced workers (Line 3 in Figure 7). As profitability decreases, the need to expand capacity and hire new "cheaper" young workers also goes down. These reactions do not improve the costs and profitability of the firm. On the other hand, with older, more experienced workers dominating the workforce, quality eventually improves but not significantly enough to offset costs in determining demand.

Figure 7

Costs and proportion of senior workers (Line 1: average cost per unit; Line 2: labor cost; Line 3: percent senior workers)

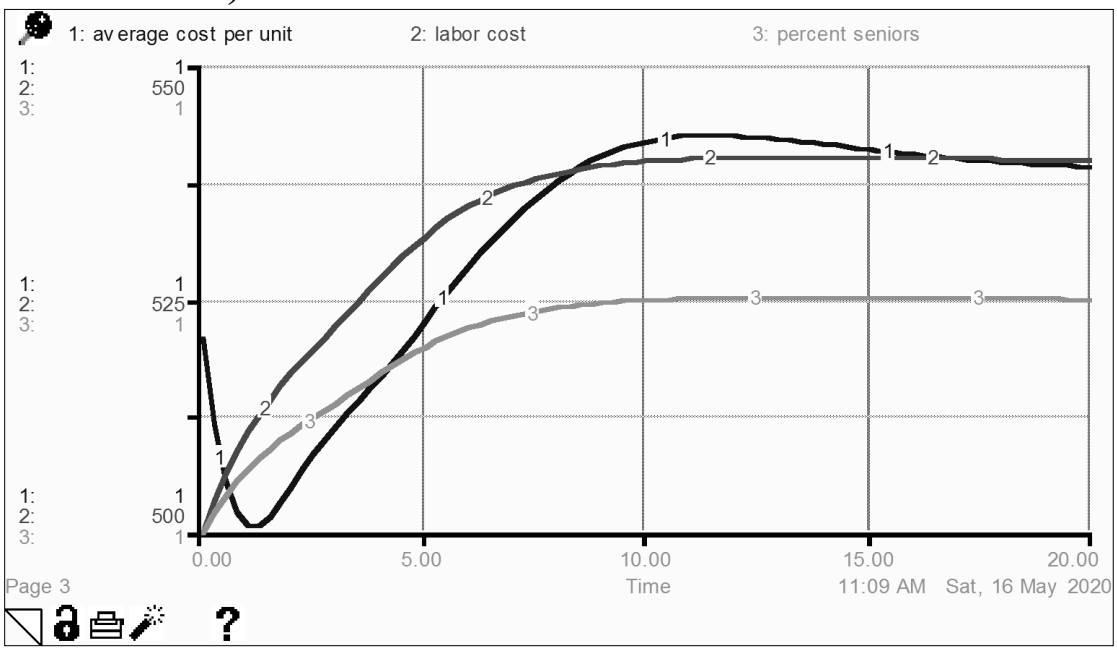


Figure 8
Demand, cost and quality (Line 1: average demand growth; Line average cost per unit; Line 3: quality)

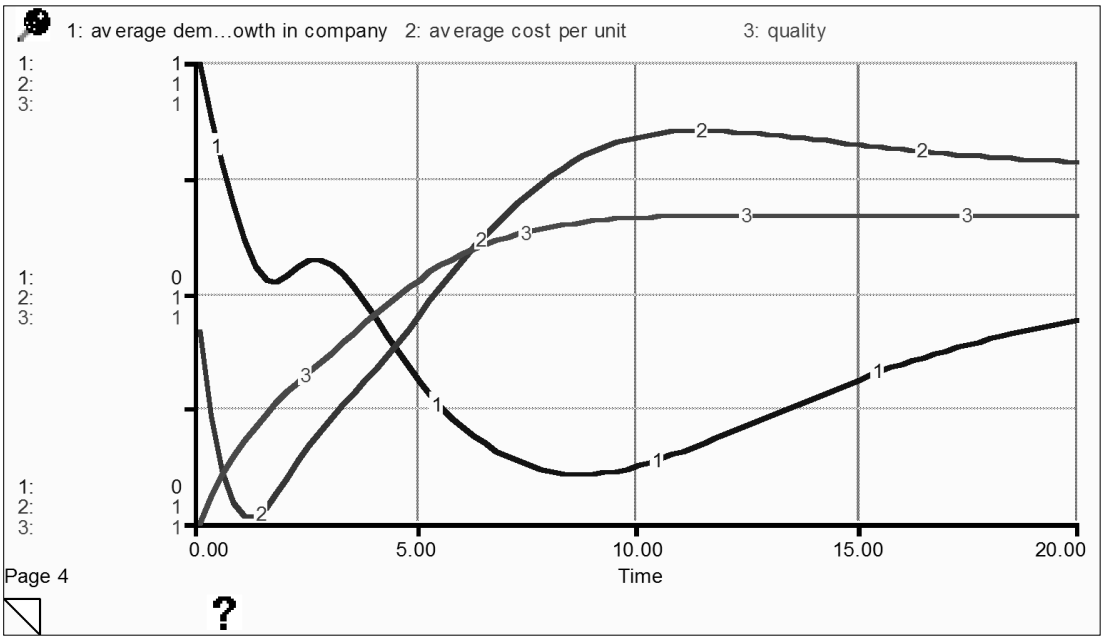


Figure 8 shows that the demand (Line 1) that could offset lower profitability in motivating new firms to enter the industry is declining in the first part of the time horizon. This is explained by the increased costs (Line 2) that cannot be sufficiently canceled off by improved quality. Quality (Line 3) is improving because older experienced workers influence product quality. However, quality has a decreasing rate of improvement that stagnates later (which is not attractive to the market).

Tests

The purpose of this section is to test the effectiveness of efforts of the MASIDO to stimulate and improve the industry. Their interventions come into two types: promotion and marketing projects and industry impact projects. The promotion and marketing projects, which include the shoe festival bazaars and the establishment of the Marikina Trade Center, are intended to help the firms get the needed marketing exposure as well as to create new markets for the industry. On the other hand, the industry impact projects aim to improve worker skills. Interestingly, the projects related to the introduction of Footwear Technology courses for Senior High School and creation of the Footwear Engineering course at the Marikina Polytechnic College can equip new graduates with higher levels of skills when they are hired in the industry.

The promotion and marketing projects provide additional exposure to the shoe manufacturers' products to the market. This can directly affect the demand for the products. This is shown on the left side of Figure 9. However, the success of the exposure can increase demand depending on factors such as attendance and participation by buyers, displays, experiences during the fair, etc. Thus, the impact may vary from no impact to perhaps doubling the demand.

In the simulation model, the promotion and marketing projects are tested by their impact on the demand. Different levels of impact at 10%, 20%, and 50% improvement in the demand function are introduced at time 20. It is assumed that the intervention is consistently implemented over the rest of the time period. The results are shown in Figure 9.

Figure 9
The feedback system with the MASIDO intervention projects

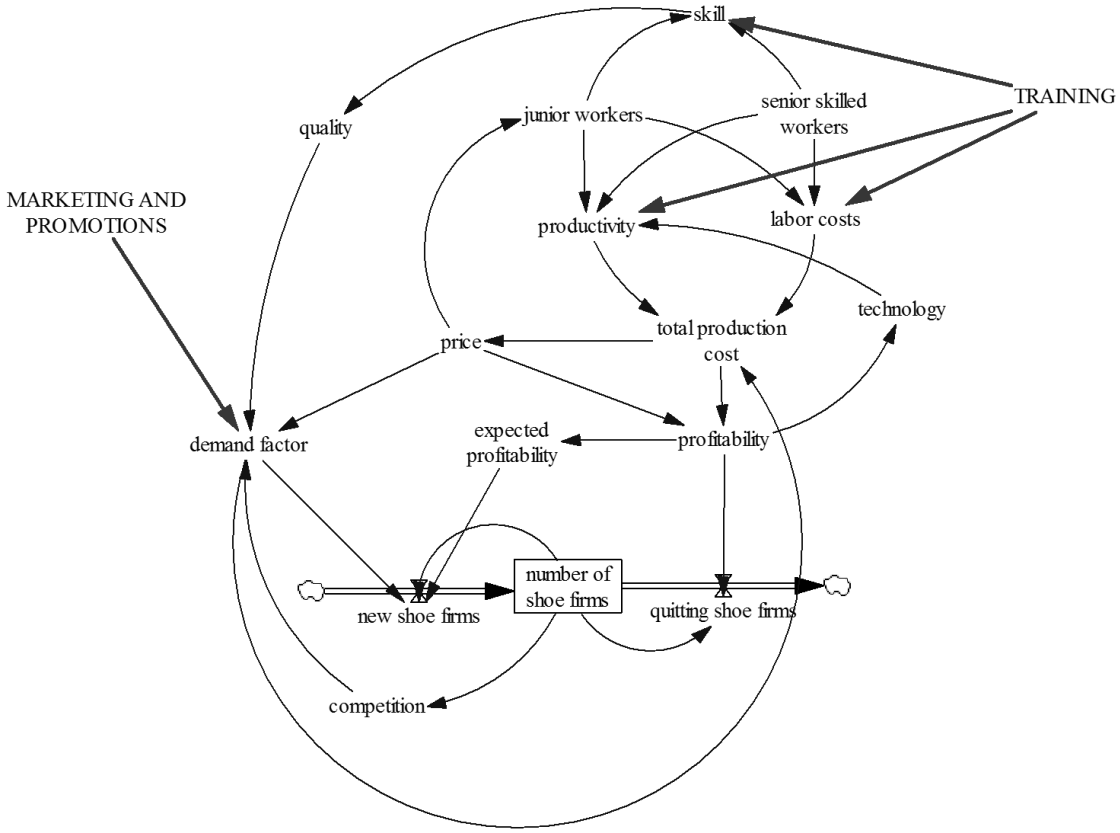
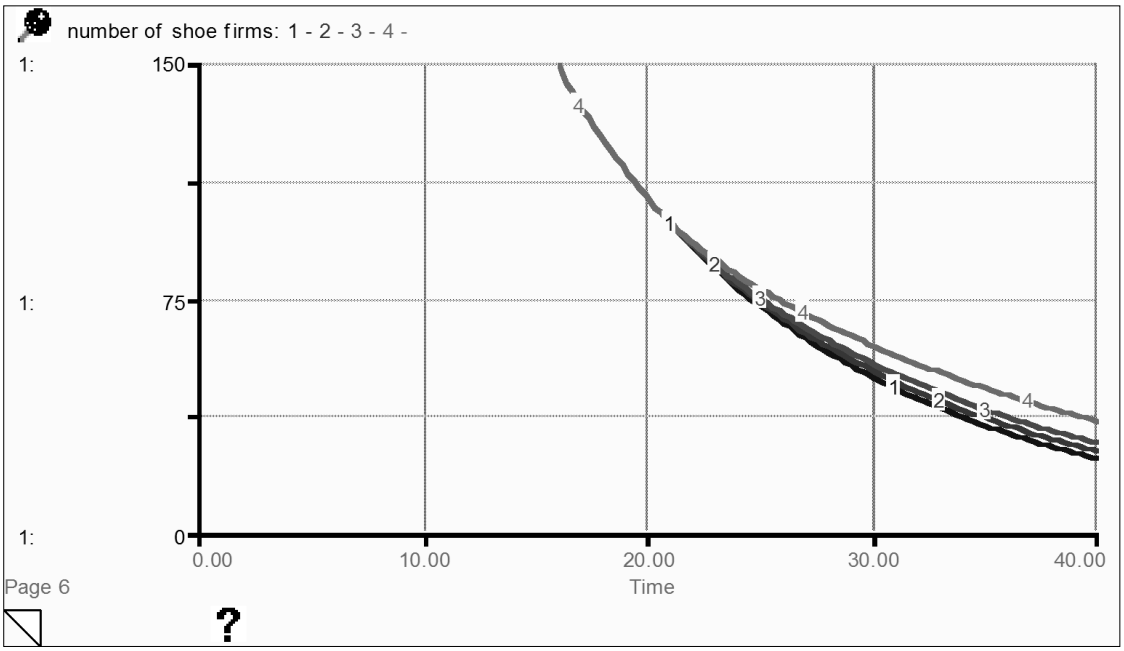


Figure 10
Implementing the promotion and marketing (Line 1: base run; Line 2: 10% impact; Line 3: 20% impact; Line 4: 50% impact)



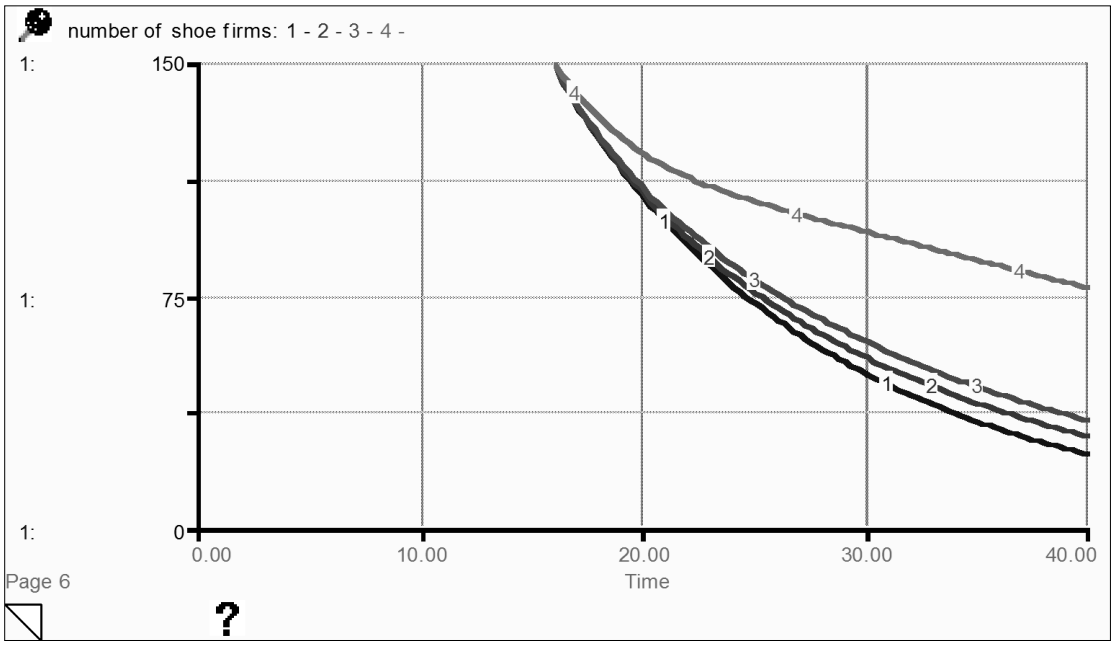
The top part of the graph was cut off as it was the same as the earlier graph of the number of shoe firms. The effects of marketing and promotion intervention are seen at time 20 as the lines fork out showing different levels of success of the marketing promotion. Line 1 is the base run without any intervention. It is shown that indeed there is an improvement in the number of shoe firms but the effects are minimal on the number of firms in the industry.

The little improvement in the number of shoe firms from promotion and marketing support can be traced to its impact that is limited only to demand but not on costs. The demand encourages new entrants into the industry but does not control the number of those quitting the business due to profitability. There is an only marginal improvement when the additional demand slightly reduces costs through volume orders. But this can also be offset by increased competition. In the end, the costs remain basically the same, and profitability is only slightly increased.

The industry impact project is similarly conceptualized. Training, which is the main thrust of this intervention, affects three factors: skill, productivity, and labor costs. This is shown on the right side of Figure 9. The significance of training can be seen not on its own actions but on the observed improvements on these three variables. This recognizes the situation that not all training can be fully be understood, fully adopted, and/or fully correctly implemented.

Thus, varying levels of impact - 10%, 20%, and 50% impact on productivity, efficiency, and quality were simulated. The graph in Figure 11 shows that the most significant improvement in the number of shoe firms was from a 50% impact as it slowed down the decrease in the number of shoe firms.

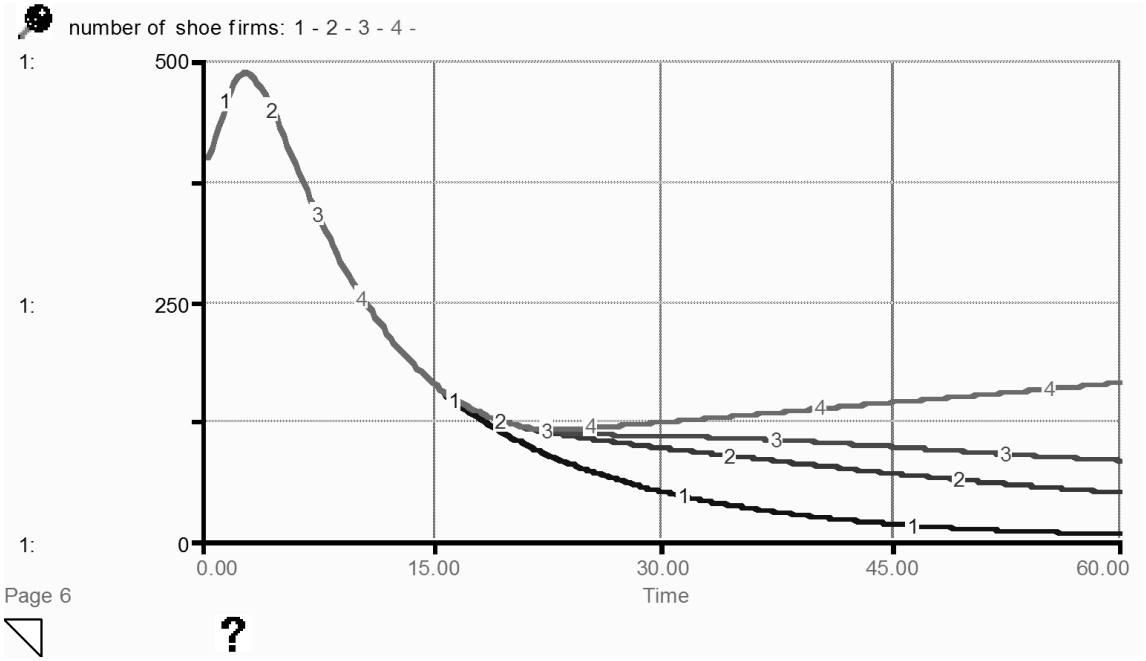
Figure 11
Implementing industry impact projects (Line 1: base run; Line 2: 10% impact; Line 3: 20% impact; Line 4: 50% impact)



The industry impact projects target the causes of cost – skills that improve labor costs, labor efficiency, and product quality. Controlling the costs leads to higher profitability that leads to fewer quitters and more entrants. A positive net rate will increase the number of shoe firms in the industry. As the effect of training increases, more cost improvements can lead to higher profitability that can induce spending on technology that further reduces costs.

Figure 11 shows a comparison between the bases run without interventions (Line 1) with that of 50% impact from training (Line 2) over a longer period of the simulation. The other two lines represent the test where together with the impact projects, 20% (Line 3) and 50% (Line 4) impact from promotion and marketing, respectively, were implemented. It shows that when the industry impact and trade promotion projects should be implemented hand-in-hand and can reverse the decline when both have a significant impact.

Figure 12
Implementing both interventions together (Line 1: base run; Line 2: with 50% impact from industry impact projects; Line 3: 50% impact from industry impact projects + 20% impact from marketing; Line 4: 50% impact from industry impact projects + 50% impact from marketing)



The combined effect of promotions and marketing and delivering provides more benefits to the industry in terms of the number of firms. The basic reason is that these two strategies deal with two different parts of the system. Marketing and promotion simply create new markets but it is the quality and cost factors that induce customers to increase the volume of orders as well as sustained relationships. On the other hand, quality products at lower costs alone need to be marketed to lead to profitability and sustained business.

Conclusions

This study analyzed the Marikina shoe industry using a simulation model to highlight the interaction of variables over time as well as to identify the feedback loops that operate within the industry. The decline of the industry was due to reduced profitability and reduced costs. This was coupled with decreased demand. Also, the quality level stagnates after some time.

The present study shows that the industry itself can be responsible for its decline through the complex interrelationship of factors. Indeed, the key to competing with Chinese products is through control of costs and the improvement in quality. Brian Tenorio laments that the shoemaking skill that was traditionally passed from generation to generation is now gone (Moral, 2013). This suggests that the quality and skill as well as the motivation and pride in shoemaking that started with its founder in 1887 has been lost in the younger generation. It is these factors that are necessary for trying to regain lost glory as the simulations have shown.

The simulation supports the twin thrusts of MASIDO marketing and technical projects to help the shoe manufacturers. The simulation showed that these two approaches of promoting the firms to attract the market and conducting training to improve skills, productivity, and quality have to be implemented together to result in maximum impact on the industry.

However, the challenge is to develop and implement successful marketing activities and deliver effective technical training. These marketing activities have to attract the maximum number of customers and successfully induce them to make sustained orders. Similarly, the focus on training is its impact on workers and would-be workers. These workers need to develop efficient skills that would lead to improvements not only in the management and operations of production processes but also on the design of products. The success of these initiatives and projects must be measured on their impact on production costs and product quality.

The feedback perspective using System Dynamics directly contributes to the literature on industrial dynamics as internal factors are considered and consistent with Krafft (2002). Indeed the model limited the effect of external competition (globalization and trade liberalization) as a reaction (or non-reaction) by the system. Also, the study was able to explain the decline without putting some blame on government taxation as well as poor supply chain. While these external factors can affect the decline of the Marikina shoe industry, the internal factors can sufficiently explain the decline.

An extension of the model that involves the interventions becoming automatic responses to undesirable events is suggested. This could create a new feedback loop – the more firms stop operating, the more interventions are implemented. A second policy can monitor production costs and implement a policy that introduces more intensive training as production costs go up. A third new feedback loop involves demand – the decrease in demand would increase promotions efforts. Other feedback loops would arise from these such as the cost of implementing these projects (and later reducing the projects as funds run out), and participation of the members as a function of work and available time.

These policy feedback loops could be integrated into the model in two ways. First, it could be tested from the external perspective of MASIDO that monitors its industry members and it organizing the necessary marketing and training activities for its members. The alternative is that these policies can be implemented within the firms. The firms can monitor their costs and request for training from MASIDO and/or they find their trainers from consultants or university professors. Similarly, when the demand falls, they can hire their marketing consultants or ask MASIDO to do promotions activities.

Finally from a more general research perspective, there is a need to closely study marketing and technical skills needs of these firms. Generic marketing approaches such as bazaars may not be sufficient to deal with the specific issues of these firms. Similarly, technical issues such as automation and advanced manufacturing technologies may be explored for these firms. These studies should identify the outdated modes of conducting business and managing operations like these could be the real causes of declining demand and increasing costs.

References

Amankwah-Amoah (2015) Explaining declining industries in developing countries, Competition and Change 1 (1)

Bayaton-Obispo, E. (2015) Marikina Shoe Industry Development Office (MASIDO) launches eCommerce project with LBC Express Inc. (Retrieved from https://www.moneysense.com.ph/marikina-shoe-industry-development-office-masido-launches-ecommerce-project-with-lbc-express-inc/

De la Cruz, A. and Juanson, J. (2017), *Understanding the Behavior of the Shoe-Manufacturing Firms in Marikina City*, unpublished undergraduate report.

Gort, M. and Klepper, S. (1982) "Time paths in the diffusion of product innovations", *Economic Journal* 92, (67): 630-53.

Krafft, J (2002). Industrial dynamics. William Lazonick. *IEBM Handbook of Economics*, Thomson Learning, pp.187-194.

Macuha, N., Garcia, Y., & Ramirez, P. (2014). Factors Affecting Exit of MSEs in Marikina Footwear. Retrieved from https://asiapacific.anu.edu.au/sites/default/files/Neill-John-Macuha-Factors-Affecting-Exit-of-MSEs-in-Marikina-Footwear.pdf

Malerba and Orsenigo, 1996, "The Dynamics of Evolution of Industries" *Industrial and Corporate Change*, 5(1); 51 – 87.

Marikina Shoe Industry Development Office (MASIDO), https://masidmarikina.wixsite.com/masido

Mendoza, J. (2012, September 28). *The Marikina Shoe Industry*. Retrieved from Academia: https://www.academia.edu/4345660/The_Marikina_Shoe_Industry

Moral, C. (2013, December 20). Made in Marikina? Not when the city is losing its shoemakers. Retrieved from http://lifestyle.inquirer.net/143597/made-in-marikina-not-when-the-city-is-losing-its-shoemakers/

Mutuc, J. (2017) The Dynamics of Industry Growth and Decline: An Exploratory Model Using System Dynamics Simulation, *Proceedings of the Global Business Conference*.

Pearl2 Project. (2006, August). *State of the Sector Report on Philippine Footwear 2005*. Retrieved from Philippine Export: http://www.philexport.ph/c/document_library/get_file?uuid=9aca41d0-8967-4402-9b6d-f277335b5c23&groupId=127524

Scott, A. (2005). The Shoe Industry of Marikina City, Philippines: A Developing-Country Cluster in Crisis. *Kasarinlan: Philippine Journal of Third World Studies*, 76-99.

Shopina, I., Oliinyk, O., and Finaheiev, V. (2017) Globalization and its negative impact on the global economy, *Baltic Journal of Economic Studies*, Vol. 3 No. 5.

Senge, P. (1990) *the Fifth Discipline*, Double Day, New York

Sterman, J. (2000) *Business Dynamics*, McGraw Hill, U.S.

Tanchuco, J. Q. (2005). *Liberalization and the Value Chain Upgrading Imperative: The Case of the Marikina Footwear Industry*. Retrieved from De La Salle University: http://www.dlsu.edu.ph/research/centers/aki/_pdf/_concludedProjects/_volumeI/Tanchuco.pdf