The Future of Technology

New Mexico

Supercomputing Challenge

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Team 130

School of Dreams Academy

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Executive Summary

The idea of the project is to determine the growth of business success with relationships with other businesses in a similar industry. This project provides an example that argues that businesses can grown with a large amount of profit if they do great things for the everyday consumer.

The project includes two types of models. One, a computation model, represents business relationships. The second, a mathematical model, shows the operation of business connections.

In this experiment, there was a large amount of research conducted. Both successful and unsuccessful business helped with the operation of the models. Companies such as: Wal-Mart, Blockbuster, Facebook, and Radio Shack were considered during the research part of the project. Although it was difficult to find stock reports, it was accomplished with several primary and secondary sources.

Sources from Business Insider and Macroeconomics written by Paul Kregg were used to determine the best possible prediction for company success. Using supply and demand, two of the most important factors in economics, graphs were completed to describe the operation of business tasks.

A conclusion was made that, businesses who inherit goods and services from other businesses typically have a higher profit than those that do not share with others. However, a conclusion was also made that if a business has higher involvement with a short amount of secondary businesses, then the secondary businesses will have a better chance for profit due to optimum expansion opportunities.

At the beginning of this project the object of this experiment stated, "Technology has grown quickly, and if I could model future outbreaks of this "disease," then that would be optimal. At the end of my project, I would like to be able to know about the latest in technology and what we have to lookout for in upcoming years." The intentions of this research was to determine technological outbreaks, however, this project has turned into a look into business operation.

The problem is that there are too many failing businesses. There will always be failing businesses. In the experiment, several types of businesses were researched to develop a conclusion on how to have a running business. Using this research, a plan for a computational and mathematical model was conducted.

In the corporate world, businesses typically fail due to debt or terrible management. These are independent variables that end up affecting the falling dependent variable. To figure out the different types of variables involved in business operation, research on business-based websites was conducted.

Some of the research conducted described keys for business performance. These included having great customer and business relationships. This gave a key component to the computational model. In this model, it shows the research that played into the different types of businesses.

Methods Used to Complete Experiment

I. Research

During the project, two important factors were researched. These included business relationships and economics in business. The following displays the effects of both topics in the solution for this experiment.

i. Economics

In the Economics portion of this project, definitions needed to be set on the types of equations that this part of the research would be utilizing. Therefore, I began taking Macroeconomics and Microeconomics at the University of New Mexico to improve my vocabulary for the project. Taking the courses allowed me to commit myself to finding business relationships

a. Supply and Demand

Supply and Demand are two of the most important parts of this project. In Figure 1 the two are displayed in a graph. Supplied quantity and price always increases when the demand of consumers decreases in quantity and price. At first it is a tough concept to grasp, but after awhile it shows as a great example for the first part of business profit.
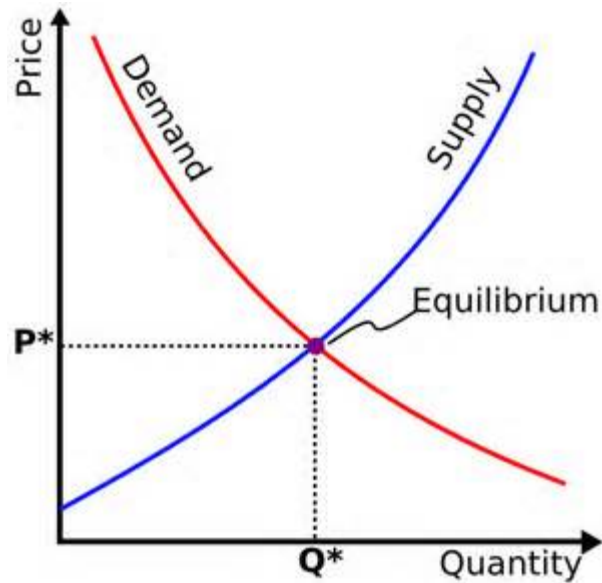
Figure 1.

Businesses have a great chance to be happy when their product is at the top right of the graph.

b. Utils

This part of economics is not a true term, but represents satisfaction. This term was used when determining a mathematical model for the project. The term is as follows:

U (100)=TS

U=Utils, TS=Total Satisfaction

When someone is very pleased, they have full satisfaction. If customers are willing and able to purchase an item they will have a full amount of utils. Utils are a tough concept to understand, but it basically stands for satisfaction between a consumer and producer.

c. Producer Surplus

      In this station, businesses love their chance for profit. However, this is not a great situation for consumers. Therefore, consumers need the ability and willingness to purchase the producers items. Figure 2 shows producer surplus. The shaded area represents where businesses have the absolute advantage of selling an item to a consumer. Above the producer surplus is the consumer surplus where consumers have the absolute advantage.
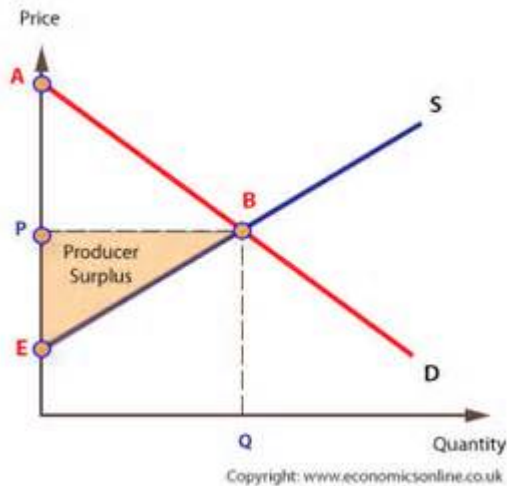

Figure 2.

ii. Business

a. Business Relationships

The biggest component of business success comes from relationships with other businesses. If a Sandwich shop did not have a connection for wheat with another business, then people would not go to this shop. If the Sandwich place had connections for wheat, vegetable, and meat, then more people would come to eat a sandwich at this place.

When researching this topic, it came that businesses don't always get along with their providers. This causes secondary and third sources of production. This causes issues in price, quality, and selling. Consumers and producers don't like this and can lose their business due to this type of issue. My current code describes business relationships through the usage of links.

b. Consumers Ability and Willingness to Purchase Products

Anyone who purchases an item must have two things in order to purchase an item. The first is willingness to purchase an item. If you want an item, then you have passed the first stage of the step to purchasing something. The second stage is having the ability to purchase an item. If you have five dollars and are willing to purchase a candy bar for four dollars, then you have passed through the economic test.

Businesses try to involve consumers in this manner. They raise prices for items that are normally purchased. This raises profit level and business satisfaction. Therefore, the business will have total utils. This describes the amount of satisfaction that

they have and the level of producer surplus that they can obtain.

II. Netlogo

a. The First Stages

In October, I decided that using Netlogo would be the best possible decision for my project. I decided to look at different models in the Models Library and decided to create some that related to technology. By the time for the Interim Report I was aware that I had put a difficult project on my plate. Therefore, I decided to take a category of my original project idea and complete it by the Expo.

At this time, I decided to begin on a simulation that had a bird's eye view of a street. This model can be seen in the Appendixes under Figure 1A.

The original idea of the project was to have turtles acting as humans on an everyday basis. The turtles would go to different businesses and purchase items from them. The businesses in the town would then receive an arrow on top of their location representing if they were successful, unsuccessful, or neutral.

However, the representation of business success is not determined by a day's worth of work. Business success is represented as a whole line of consumer and producer happiness. It is also represented with a profit and increase in development. The idea for a green, yellow, or red arrow did not include variables that were constant and had great representation of the true project.

This idea seemed like it was progressing, but the project was not well defined after a conclusion was made in the model. Therefore, an adjustment was made in

the direction of the coding.

b. The Next Stage

After I realized that the original idea was not going to work, I began to look at the Model's Library again. The next model I decided to try featured two businesses. In the model they are divided into two halves. During the model, the two businesses try to earn more utils from consumers through their product. This causes a disturbance in the two halves of the model. This is shown as the average day for people who want a successful business.

This model was very useful while research was being conducted on producer and consumer surplus. It helped by integrating two sides of the same type of business. One of the thoughts that played into this was a situation between Facebook and MySpace.

MySpace was roaring in 2005, but with the release of the social networking site, Facebook, MySpace began to see less interaction between members of the site. Many people believe this was just a new form of social media that intrigued the members. Yes, this was one of the benefits of the new site, but management also played a huge role in this situation.

The founder of Facebook had the brain of a teenager. He knew exactly what the users of this product would need from a site like Facebook. Therefore, he used his absolute advantage versus MySpace to create one of the greatest websites of all time. The owner of MySpace did not cooperate with the new idea with happy thoughts. This destroyed MySpace because it did not jump on the types of entertainment that was

available. Communication between interfaces really changed the powerhouse between these two sites. The one who played it the smartest won the battle.

Everyday businesses battle with competition. Management needs to stay focused to keep a strong producer surplus in order to keep the benefit of the doubt.

On the other hand, the code that was being included with this part of the project did not successfully show the research of business interaction as well as it should have.

In the Appendixes, under Figure 2A. is a picture of the idea from the code that was used to model this situation.

c. Current Stage

As of now, the model is represented with connected links. These links represents the different parts of a business. These include: business and consumer relationships, production and selling of product, and management. All of these components represent a size of a company in order to assure a high amount of utils. This will be represented with the equation: $Producer\ Surplus +$
$Consumer\ Surplus = Total\ Surplus$

With the ultimate satisfaction through utils, this is obtained.

The thought of working with links was assisted with one of my mentors. As a team, we worked out different solutions and determined the idea behind the design. This was a huge part of the project because it showed a great example of trial and error. This design was another new idea that was able to represent my equations.

At the beginning of the code, a single business is made as the primary business. Then, based on the amount of businesses selected, links branch from the primary business to create secondary businesses. These secondary businesses represent different components of businesses. After this simulation begins, links start to expand in different directions to create a whole business structure.

Inputs toward the code represent three components of business finances. Debt, Profit, and Income are those three. Shown below is a representation of a business's possible financial situation.

Components	Price of each component
Income	$5,160,250
Profit	$4,309,460
Debt	$850,790

Figure 3

If a business has an income of $5,160,250, but has a debt of $850,790, then the profit will always be the Income minus the Debt. Therefore, in this equation, the profit will equal $4,309,460.

The code begins at a point for the primary business in price. It has a number for Income, Profit, and Debt. This allows flexibility for people viewing the code to see the financial situation of business success.

As of today, the code only represents the above situation. However, by the

Los Alamos Expo, it is expected for the code to find a solution to the growing problem of entrepreneurship.

A picture of the codes method in shown below as Figure 4.
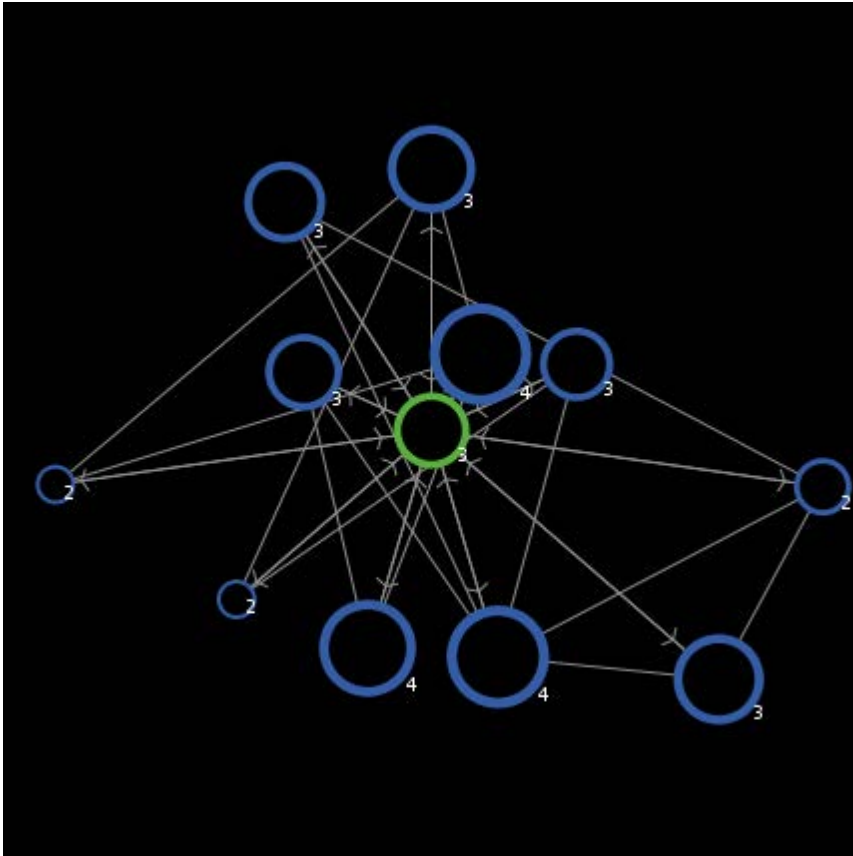

Figure 4.

Mathematical Model

x = Number of Items Purchased

y = Sum of Price of the Items

$(xy)^2$ = Total Output of Production, Profit and Selling

Consumer Surplus + Producer Surplus = Total Surplus

Total Satisfaction is always equal to Utils (a)

When a = Amount of Satisfaction of a Producer or Consumer

The following equations showed the level of satisfaction through the supply of product and demand from consumers. Utils were also introduced as a level of measurement for business owners when they find total satisfaction through producer surplus. These mathematical models seem to best represent this project based on business satisfaction.

Business and Technology Usage

Percentage of Businesses Using Technology (y-axis: 0, 20, 40, 60, 80, 100)

Years in Decades (x-axis: 1950's, 1970's, 1990's, 2010's)

— No Technology Usage
— Low Usage of Technology
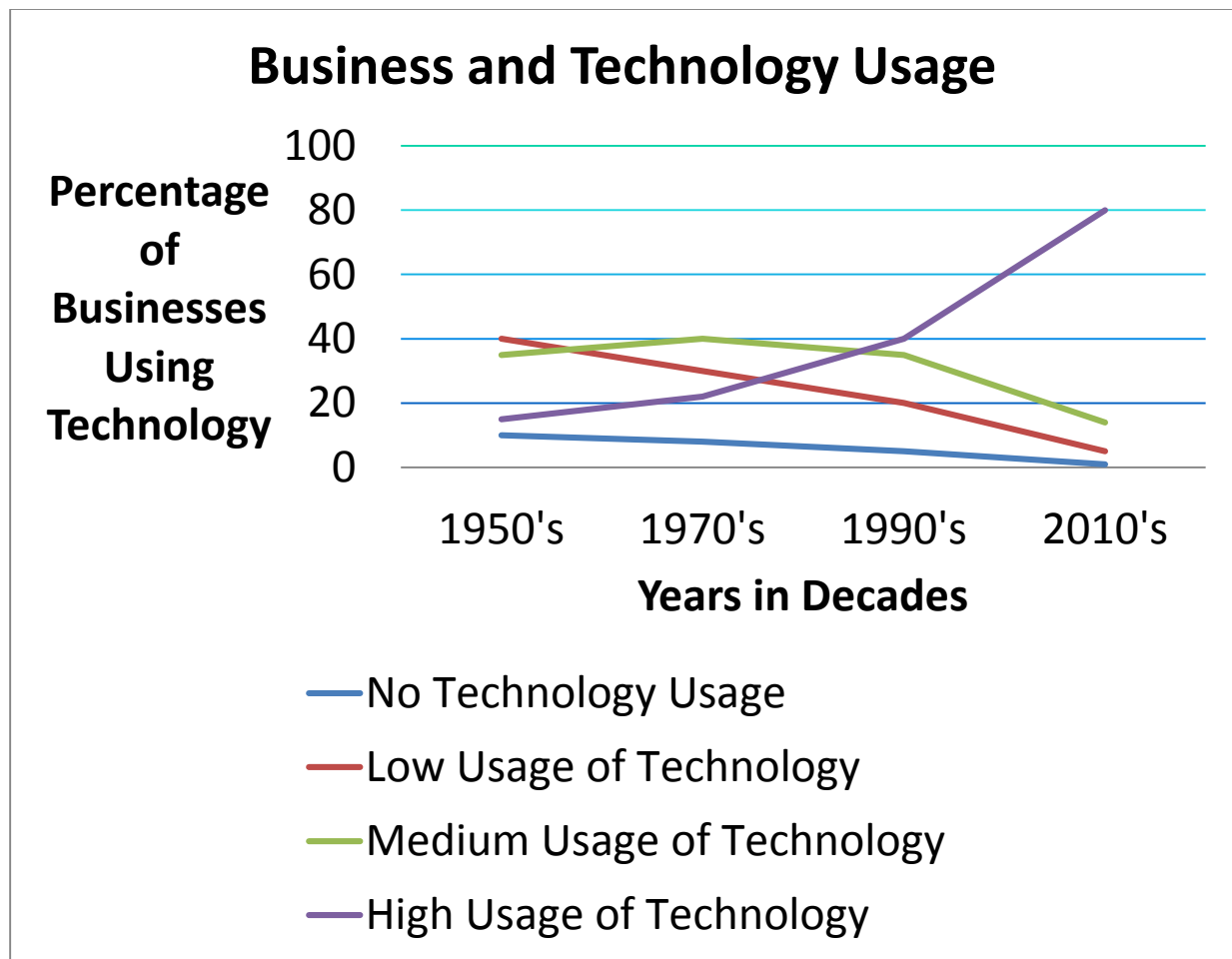— Medium Usage of Technology
— High Usage of Technology

Figure 5.

In Figure 5., above, technology usage is shown from the past few decades. There is a noticeable increase in a high usage of technological advancements in the last twenty years.

Verification of Model

After the completion of a portion of code, there was a method used to verify the information written per day.

Day of Week	What was Checked
Monday	Input Verification
Tuesday	Totals for Debt, Profit, and Income
Wednesday	Verification of Mathematical Model with Different Business Models
Thursday	Reports Written on Project
Friday	Computational Model Set-up
Saturday	N/A
Sunday	N/A

Figure 6.

Results

At the end of this project, it was determined that businesses with more correlation with other businesses tend to have a higher chance for ultimate profit and income. If a business does not have great correlation with other companies or does not need this, then they will need to have great management and will need to fall under a high level of satisfaction for consumers. Those with great customer satisfaction will always have business to keep with the growing economy.

A big part of this research looked at failing corporations. The biggest corporation was Blockbuster.

- At its peak in 2004, Blockbuster had up to 60,000 employees and over 9,000 stores.

- Filed for bankruptcy in 2011

- Bought out from Dish the same year

- Continues to have a connection with Dish as "Blockbuster on Demand"

- 0.01% Stock

Blockbuster was a growing company, but problems with customer satisfaction and management ending up causing this problem for the entertainment company.

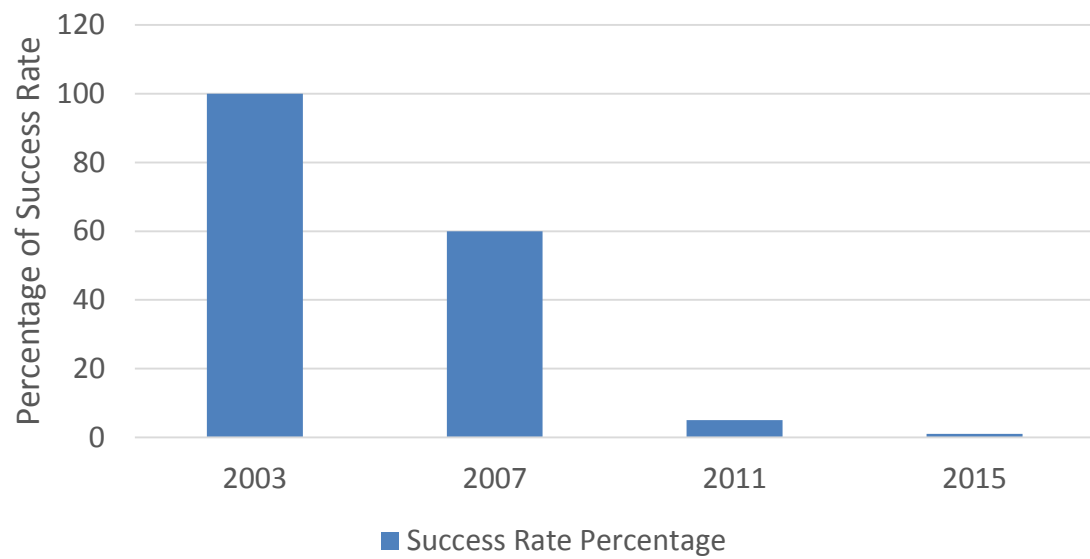# Blockbuster Entertainment Success Rate Percentages through the years

Figure 7.

Conclusion

In conclusion, this project has taught me about the advantages and disadvantages of owning a company. The business industry is very difficult to keep stable with thousands of new companies starting each month.

Businesses need to have great relationships with their providers of products and supplements in order to keep supply high. If demand is high, supply will be low. This creates a suggested equilibrium price. This price is met when supply and demand are the same. This means that shelves in stores will be empty at this rate in the financial and stock part of business relations.

Blockbuster ended up doing the bad part of the situation when they had an extremely low demand. However, the supply of movies was high. This brought a conclusion that having a high demand is better for businesses with less than acceptable management.

Other businesses have had the same issues, but all businesses to keep a steady pace with their supply. If you supply too many items, then you will need to have great customer relations.

The models that are included in this project show the different everyday interactions between corporations that trade products to each other. They represent different sides of the argument that show connections between businesses and management success. This project is still in continuation and is expected for completion in the near future.

Significant Achievement from Experiment

Working on a huge project is difficult. Doing it alone is a completely different story.

At this point, I feel like I have made some great accomplishments. The biggest one is being able to submit each assignment on time. As a senior I have learned to commit to deadlines for applications, scholarships, and homework assignments. The project was one of the many things that I committed myself to accomplish. The great part is that I did end up going to the final report.

In the past few years, I decided to complete a project by myself to commit more time to the challenge. This year was difficult because I chose a very hard project and because I decided to take twenty-one college credits in two semesters. I also committed myself to compete on my high schools golf team.

After realizing my struggle, I decided that it would be best for me to ask a mentor to help with my project. This mentor stepped up and taught me a lot of things. Doing this helped me learn and to understand that mentors are there to help with the project. This is a great accomplishment to be able to say that I completed the Challenge. I am glad that I did this and it is great to be one of the many finishers.

Acknowledgements:

I would like to thanks the Challenge mentors, executives, and volunteers. Without you, I would have not been able to learn programming.

I would like to thank my mentors and teachers Eric Brown, Talysa Ogas, and Creighton Edington for your generous support in me. Thanks for helping me on this project and for making sure that I stay on track with all deadlines.
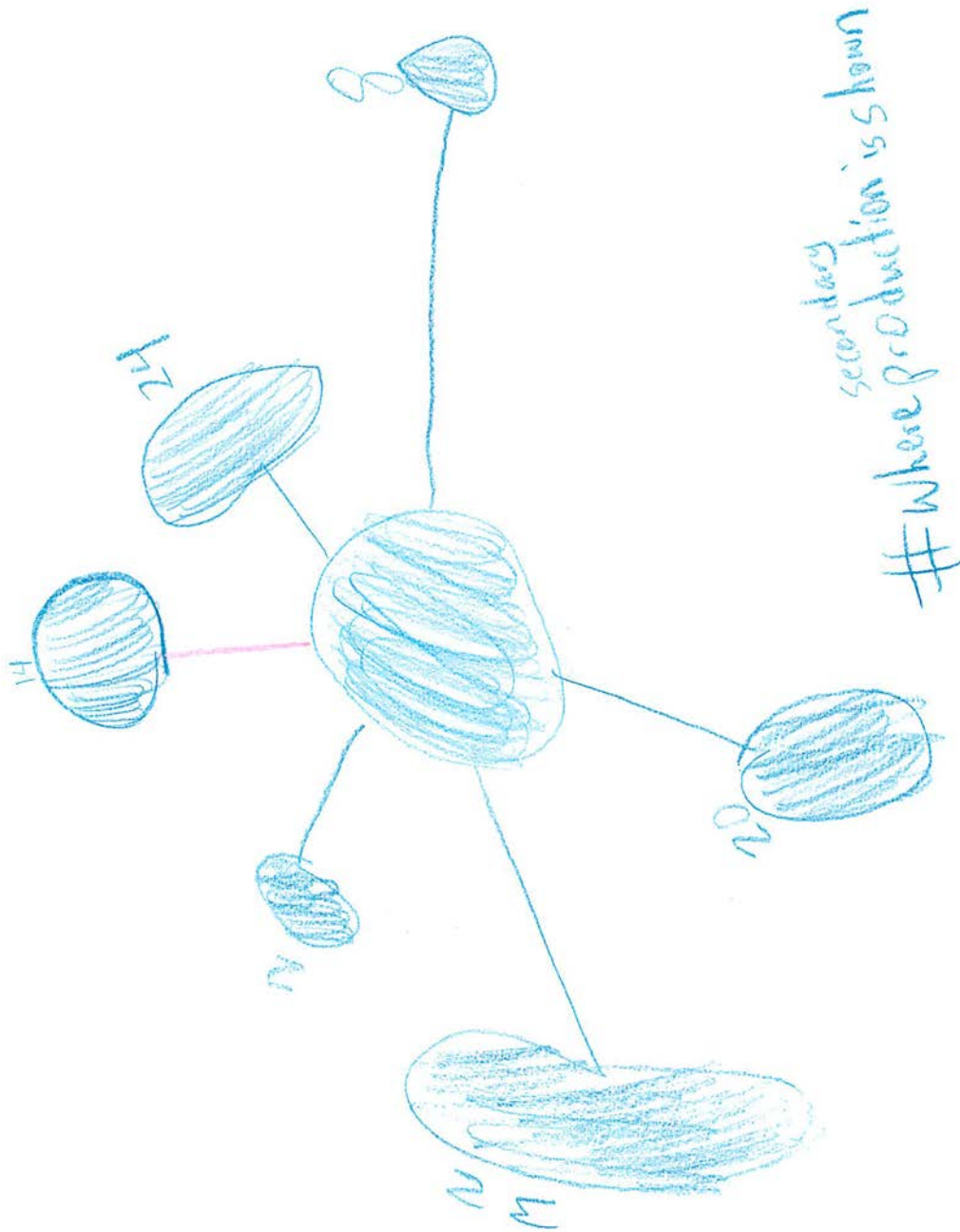
With much thanks,

Jose Montoya

Appendix A.

Appendix B.

23
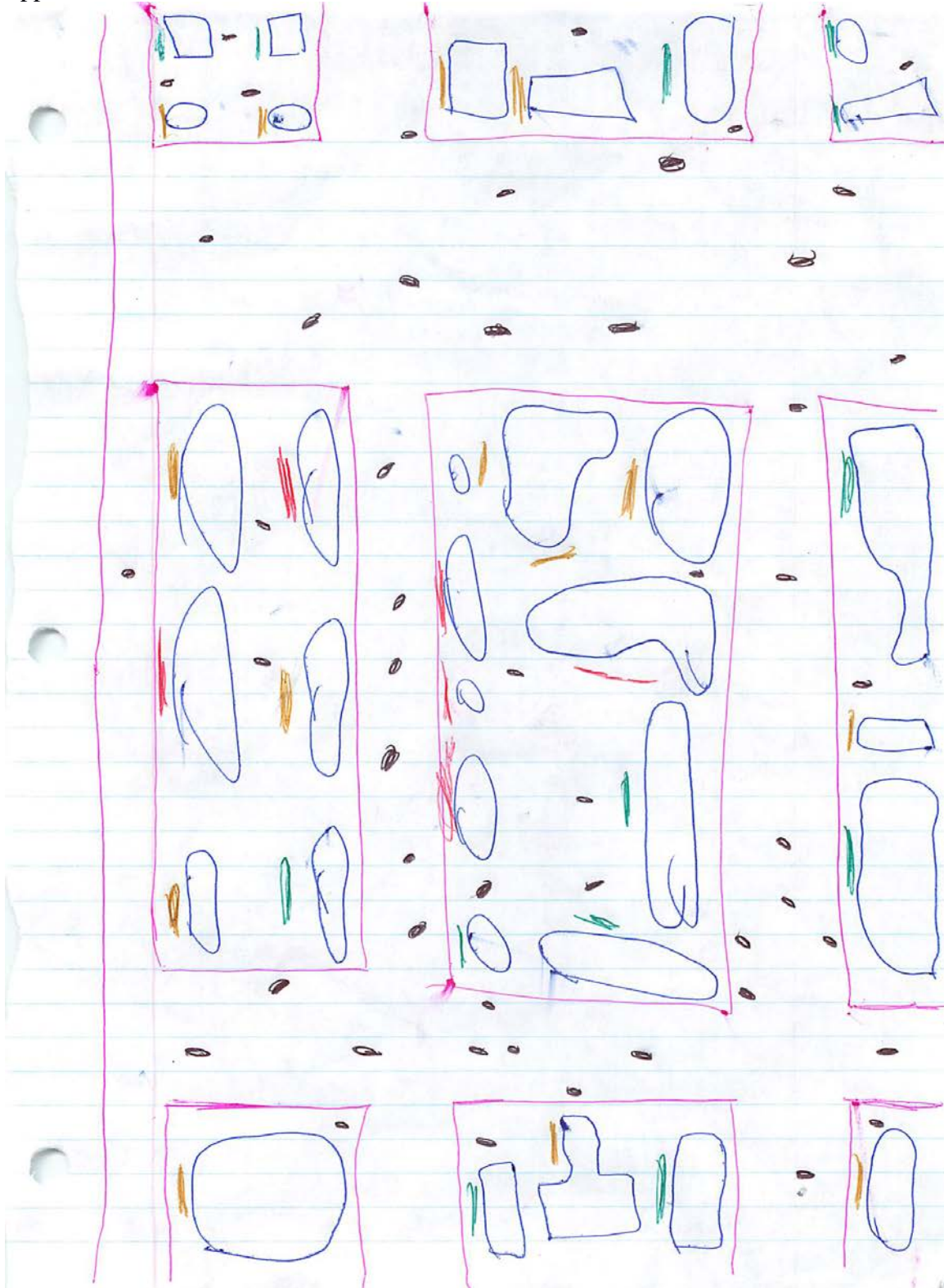
Appendix C.

Appendix D.

The following is the code written at this point:

breed [businesses business]

breed [companies company]

turtles-own

[

  income

  debt

  balance

  to-be-paid

  to-be-collected

  connections

  input-A input-link-A

  output-A output-link-A

  input-B input-link-B

output-B output-link-B

input-C input-link-C

output-C output-link-C

input-D input-link-D

output-D output-link-D

input-E input-link-E

output-E output-link-E

input-F input-link-F

output-F output-link-F

]

directed-link-breed [red-links red-link]

undirected-link-breed [blue-links blue-link]

```
to setup

 clear-all


 create-companies 1

 [

  set shape "circle 2"

  set balance (( random-float 3) + 1 )

  set size balance

  set color yellow


 ]




 create-businesses number-of-businesses

 [

   set shape "circle 2"

   set income (( random-float 4) + 2 )

   set debt (( random-float 1) + 1 )
```

```
    set balance income - debt

    set size balance

    let angle   ( 360 / number-of-businesses )

    set heading angle * who

    let move-away random-float ( max-pxcor - 3 )

    forward move-away + 3

    set color one-of [ red green ]



]



;; create links in both directions between turtle 0

;; and all other turtles

ask turtle 0 [ create-red-links-to businesses ]

ask turtle 0 [ create-red-links-from businesses ]



;; now create undirected links between businesses
```

```
ask businesses

 [

   let temp-random-seed random number-of-businesses

   set temp-random-seed temp-random-seed + 1



   if temp-random-seed != who

   [

     create-blue-link-with business temp-random-seed

    ]

 ]



;; add some random links

ask businesses

[

  let temp-random-seed random number-of-businesses

  set temp-random-seed temp-random-seed + 1
```

```
   if random 1 = 0

 [

    if temp-random-seed != who

   [

     create-blue-link-with business temp-random-seed

    ]

  ]

]



;; divide the connections between each business

ask turtles

[

 set connections ( count my-links)

 let temp-count connections

 while [ temp-count != 0 ]

 [
```

```
      set temp-count temp-count - 1

   ]




   ]



   display-labels

   show count links ;; for comparison later?

end



to display-labels

  ask turtles

  [

   set label ""
```

```
    ]

  if show-balance?

  [

    ask turtles [ set label round balance ]

   ]

end


to go

 ask turtles

 [

  if color green

  [

    set to-be-paid balance * random-float 1


    ;; pay to yellow

   ]

  ]
```