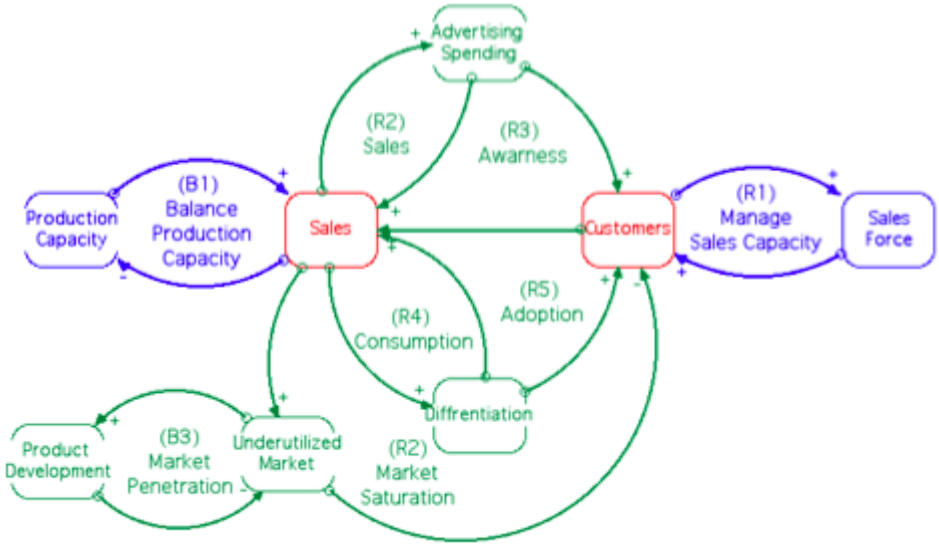
Complete Model Documentation

This Document Contains the complete model described in Amr Farouk and Saleh Paper An Explanatory Framework for the Growth of Small and Medium Enterprises, This Appendix describe the stock and flow diagrams, and with full variables description and mathematical formulation. The model was written and analyzed using Stella software available from isee systems on http://www.iseesystems.com/
The following figure provides an overview of the submodel Diagram

1. Submodel:



The submodel described as follow:

Advertising Spending: This Sub-module represent the dynamics of optimizing advertising spending.
And the effect of Uncertainty, internal information delay and limited know how on the ROI in Advertising

Customers: This Submodule Represent Customers acquiring and loosing dynamics, including the effect of Advertising, Sales Force and Differentiation on Adoption rate.

Differentiation: This Sub-module represent the dynamics of optimizing Investment in different differentiation activities including increasing product quality, variety, adding new features or acquiring new technology.
The dynamics of differentiation include its effect on adoption and consumption and the effect of Uncertainty, internal information delay and limited know how on in level of investment in Differentiation

Production Capacity: This Submodule represent the dynamics of managing utilization and acquisition of production capacity

Product Development: This Submodule represent dynamics of overcoming market saturation by new product development.

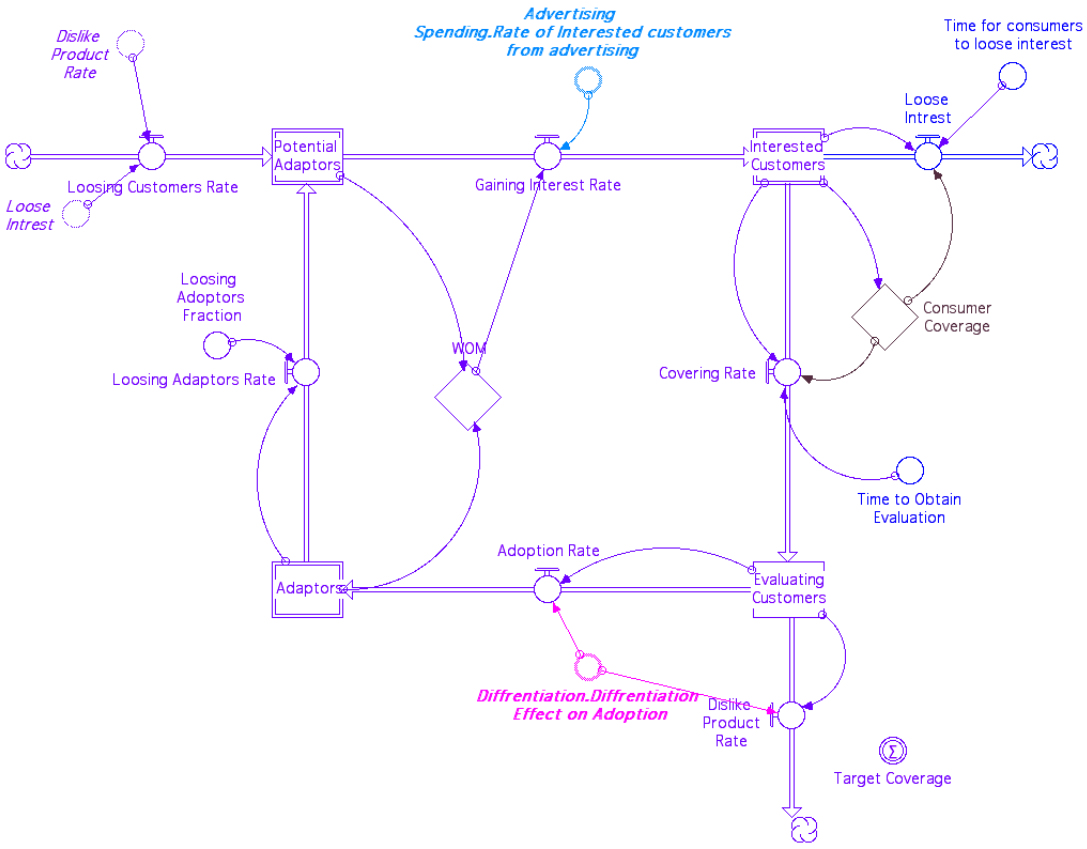
Sales: This Submodule represent the firm's dynamics of obtaining and fulfilling sales, as affected by demand, sales effectiveness and production capacity.

Sales Force: This Submodule represent the dynamics of managing sales force capacity utilization and acquisition

Underutilized Market: This Submodule represents the current level of market saturation, in the stock and flow diagram the components of this module were redistributed on differentiation and product development Submodule.

2. Customer Submodule:

This Sub module Represent Customers acquiring and loosing dynamics, including the effect of Advertising, Sales Force and Differentiation on Adoption rate.



Adaptors(t) = Adaptors(t - dt) + (Adoption_Rate - Loosing_Adaptors_Rate) * dt

INIT Adaptors = 4000
UNITS: customers (customer)
DOCUMENT: This Stock Represent Customers who already tried the firm's prodcuts and are found the product quality to be satisfactory, so they become adaptors for the products, or in other words loyal customers.
Units = Customers
Initial Value = 4000
INFLOWS:

Adoption_Rate = Evaluating_Customers* Diffrentiation.Diffrentiation_Effect _on_Adoption UNITS: customer/mo
DOCUMENT: The rate at which new customers are converting to be adaptors when trying firm's products, this rate is mainly affected by the level of differentiation in firm's product.

Units = Customer/Month

OUTFLOWS:

Loosing_Adaptors_Rate = (Adaptors*Loosing__Adoptors__Fraction) UNITS: customer/mo

DOCUMENT: The Rate at which firm loose adaptors as a result of competition and substitute products.

Units Customers/ Month

Evaluating_Customers(t) = Evaluating_Customers(t - dt) + (Covering_Rate - Adoption_Rate - Dislike__Product_Rate) * dt

INIT Evaluating_Customers = 1200

UNITS: customers (customer)

DOCUMENT: This Stock Represent Interested Customers who were successfully approached by Firm Sales Force, and in product trying and evaluation phase. Units = Customers

Intial Value = 1200

INFLOWS:

Covering_Rate = (Covering__Fraction*Interested__Customers)/ Time_to_Obtain_Evaluation

UNITS: customer/mo

DOCUMENT: The Rate at which new customers try firm's product, as a result of being approached by sales force.

Units = Customers/ Month

OUTFLOWS:

Adoption_Rate = Evaluating_Customers* Diffrentiation.Diffrentiation_Effect _on_Adoption UNITS: customer/mo

DOCUMENT: The rate at which new customers are converting to be adaptors when trying firm's products, this rate is mainly affected by the level of differentiation in firm's product.

Units = Customer/Month

- Dislike__Product_Rate = Evaluating_Customers*(1-Diffrentiation.Diffrentiation_Effect_on_Adoption) UNITS: customer/mo
  DOCUMENT: The rate at which new customers dismiss the product due to unsatisfactory from current level of differentiation in firm's product. Units = Customer/Month

Interested__Customers(t) = Interested__Customers(t - dt) + (Gaining_Interest_Rate - Loose__Intrest - Covering_Rate) * dt
INIT Interested__Customers = 2800
UNITS: customers (customer)
DOCUMENT: This Stock Represent the Customers who already developed interest in product as a result of Advertising, but have not yet tried the product.
Units = Customers
Intial Value = 2800 Customers
INFLOWS:

- Gaining_Interest_Rate = Adaption_from_WOM+ Advertising__Spending.Rate_of_Interested_customers_from_advertising UNITS: customer/mo
  DOCUMENT: The rate at which new customers develop interest in firm's products a month, as affected by advertising.
  Units = Customers/Month

OUTFLOWS:

- Loose__Intrest = (Interested__Customers*Out_of__Coverage_Rate)/ Time_for_consumers_to_loose_interest
  UNITS: customer/mo
  DOCUMENT: The rate at which newly interested customers loose interest as a result of lake of product availability.
  Units = Customers/Month
- Covering_Rate = (Covering__Fraction*Interested__Customers)/ Time_to_Obtain_Evaluation
  UNITS: customer/mo
  DOCUMENT: The Rate at which new customers try firm's product, as a result of being approached by sales force.
  Uints = Customers/ Month

Potential__Adaptors(t) = Potential__Adaptors(t - dt) + (Loosing_Adaptors_Rate + Loosing_Customers_Rate - Gaining_Interest_Rate) * dt

INIT Potential__Adaptors = Total__Population-
Interested__Customers- Evaluating_Customers
UNITS: customers (customer)
DOCUMENT: This Stock Represent the potential customers who were not yet approached by the firm,
Units = Customers
Initial = Total Population - approached customers
INFLOWS:

Loosing_Adaptors_Rate = (Adaptors*Loosing__Adoptors__Fraction) UNITS: customer/mo
DOCUMENT: The Rate at which firm loose adaptors as a result of competition and substitute products.
Units Customers/ Month

Loosing_Customers_Rate = Dislike__Product_Rate+Loose__Intrest
UNITS: customer/mo
DOCUMENT: This is the rate at which firm loose potential customers as a result of losing interest or disliking the product
Units= customer/month

OUTFLOWS:

Gaining_Interest_Rate = Adaption_from_WOM+ Advertising__Spending.Rate_of_Interested_customers_from_ advertising UNITS: customer/mo
DOCUMENT: The rate at which new customers develop interest in firm's products a month, as affected by advertising.
Units = Customers/Month

Loosing__Adoptors__Fraction = .01
UNITS: 1/months (1/mo)
DOCUMENT: This variable represent percentage of adaptors firm loose in average a month as a result of competition and substitute products.
Units = 1/month
Variable is standardized at a level of 1% of current adaptors a month loosing interest

Target_Coverage = Evaluating_Customers + Adaptors + Interested__Customers
UNITS: customers (customer)
DOCUMENT: This Variable represent the number of customers targeted to be covered by sales force, including customers who are already adaptors and other in evaluation stage and new customers who gained recent interest from advertisign
Units = Customers

Time_for_consumers_to_loose_interest = 6
UNITS: months (mo)
DOCUMENT: This Variable represent the average time consumer stay before loosing interest in product due to non-availability of the product.
Units = Month
Varialble Standarized at 6 Months

Time_to_Obtain_Evaluation = 3
UNITS: months (mo)

DOCUMENT: This Variable represent the average time Sales force need to convience new customer to try the product.
Units = Month
Variable = 3 Months

Customers.Consumer Coverage: DOCUMENT: This Sub module Represent the effect of current sales force capabilities in approaching new customers

Avilable__capacity = Sales_Force.Covering__Capacity-Adaptors
UNITS: customers (customer)
DOCUMENT: This Variable Represent the remaining sales capacity that can be dedicated to acquiring new customers after decreasing the current customers served
Unit = Customers

Covering__Fraction = If Switch_Sales_Capacity_Effect = 1 Then effect_of_Avilable_capacity__utilization_on_covering_rate* Refrence__Covering_Fraction Else Refrence__Covering_Fraction
UNITS: Unitless
DOCUMENT: The Variable represent the fraction of interested customers that current sales force can convert to evaluation customers.
The variable is controld by a switch to isolate the effect of current capacity when needed.
Unit = Unitless

Out_of__Coverage_Rate = 1-Covering__Fraction
UNITS: Unitless
DOCUMENT: This Variable represent the rate of customers tha will be lost due to lake of coverage
Unit = Unitless

Refrence__Covering_Fraction = .7
UNITS: Unitless
DOCUMENT: This Variable represent the standard fraction of interested customers that current sales force can convert to evaluation customers.
Unit = Unitless
Variable Standarized at 70%

Switch_Sales_Capacity_Effect = 1
UNITS: Unitless
DOCUMENT: The variable is a switch to control the effect of current capacity on covering fraction when needed.
Unit = Unitless
The variable can be switch by simulation user between 0 and 1

effect_of_Avilable_capacity__utilization_on_covering_rate = GRAPH(Avilable__capacity/Interested__Customers)
(0.00, 0.00), (0.2, 0.2), (0.4, 0.38), (0.6, 0.55), (0.8, 0.7), (1.00, 0.8), (1.20,

0.85), (1.40, 0.9), (1.60, 0.95), (1.80, 1.00), (2.00,
1.00) UNITS: Unitless
DOCUMENT: This variable represent graphically the relation between Current Sales Capacity and covering capacity, the purpose of using this variable is to prevent unrealistic sharp discontinuity in acquiring customers, this method have been suggested by Sterman (2000 page 530) $F(0) = 0$ $F(\infty) = 1$

Customers.WOM:DOCUMENT: This Submodule represent the effect of Word Mouth on the arousing interestin in ew customers

Adaption_from_WOM = Interest__Fraction*Contact_Rate*Potential__Adaptors* Adaptors/Total__Population
UNITS: customer/mo
DOCUMENT: Rate of Customers Gaining Interest as a result of word of mouth
Units = Customers/month

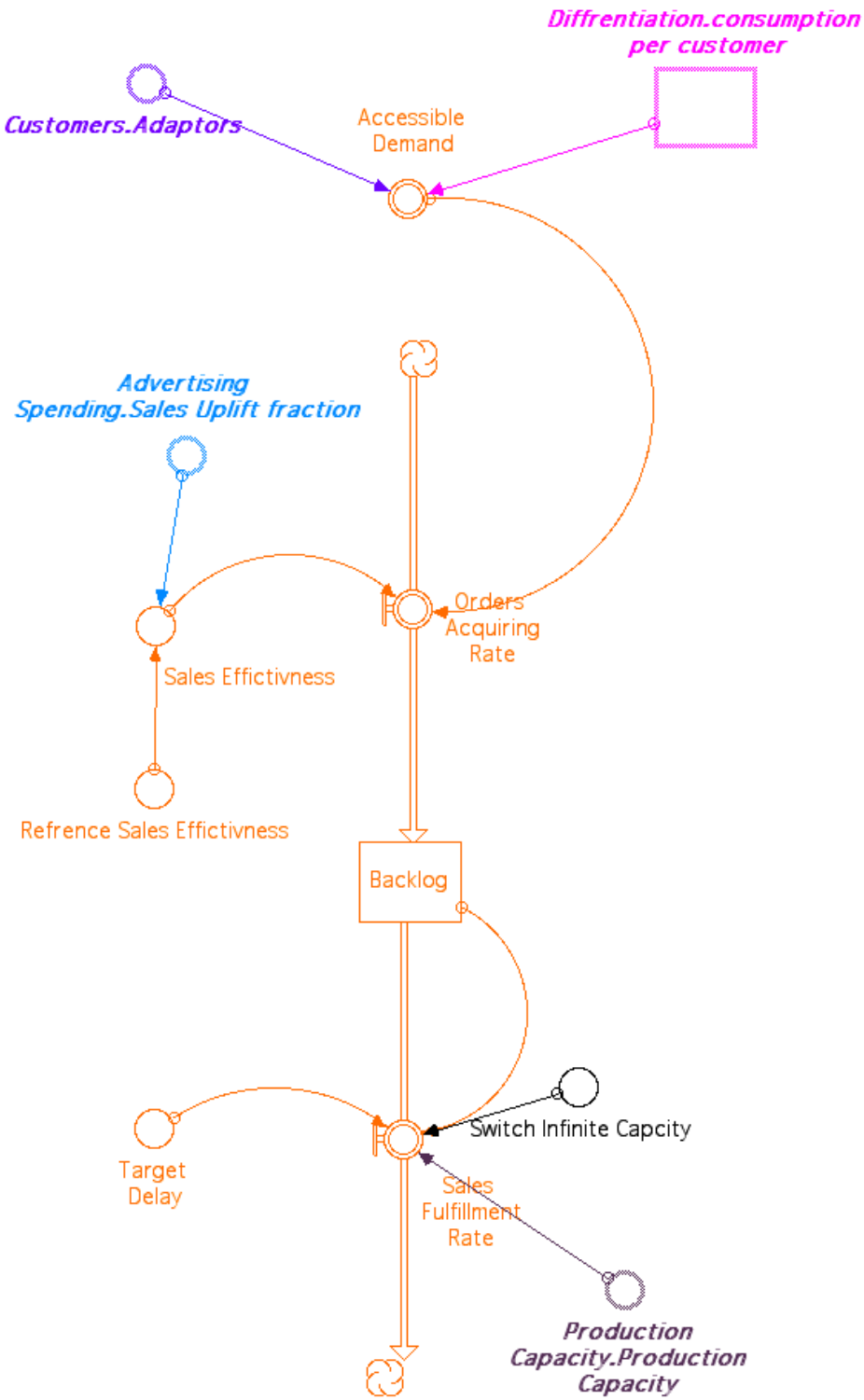
Contact_Rate = 10
UNITS: 1/month (1/mo)
DOCUMENT: The Rate at which customers contact
Units per month
Variable is standardized at 10 a month

Interest__Fraction = .0015
UNITS: Unitless
DOCUMENT: This represent the fraction of population who will gain interest in firm's product when if recpmmended by other customers
Units = Unitless
Variable is standarized at .15%

Total__Population = 250000
UNITS: customers (customer)
DOCUMENT: This is the total number of customers in the market including current adopters, potential adaptors and other customers in different adoption stages. Units = Customers
Initial Value = 250,000 Customers

3. Sales Submodule

This Submodule represents the firm's dynamics of obtaining and fulfilling sales, as affected by demand, sales effectiveness and production capacity.



Backlog(t) = Backlog(t - dt) + (Orders_____Acquiring_Rate - Sales__Fulfillment_Rate) *

dt
INIT Backlog = 25000
UNITS: units (unit)
DOCUMENT: This stock represent the current sales orders that have not yet been fulfilled.

Units = Unit/month

Initial Value = 25000 Units per month

INFLOWS:

- Orders__Acquiring_Rate = Accessible__Demand*Sales_Effictivness
  UNITS: unit/mo
  DOCUMENT: This variable represents that rate at which the firm obtain orders a month
  Units = Units/ month^2

OUTFLOWS:

- Sales__Fulfillment_Rate = If Switch_Infinite_Capcity=0 Then Min(Backlog/Target__Delay,Production_Capacity.Production_Capacity) Else Backlog/Target__Delay
  UNITS: unit/mo
  DOCUMENT: This variable represent the rate at which firm fulfill its sales, as affected by both current production capacity and target delay.
  Units = Units/month^2

- Accessible__Demand = Customers.Adaptors* Diffrentiation.consumption_per_customer
  UNITS: unit/mo
  DOCUMENT: Accessible demand represent the maximum demand that firm can achieve considering the current range of products firm offers and current customers firm
  Cover.
  Units = Units / month

Refrence_Sales_Effictivness = .4
UNITS: Unitless
DOCUMENT: This variable represent the standard sales effectiveness without other factors like change in advertising or pricing.
Units = unitless
This variable is standardized at level of 40%

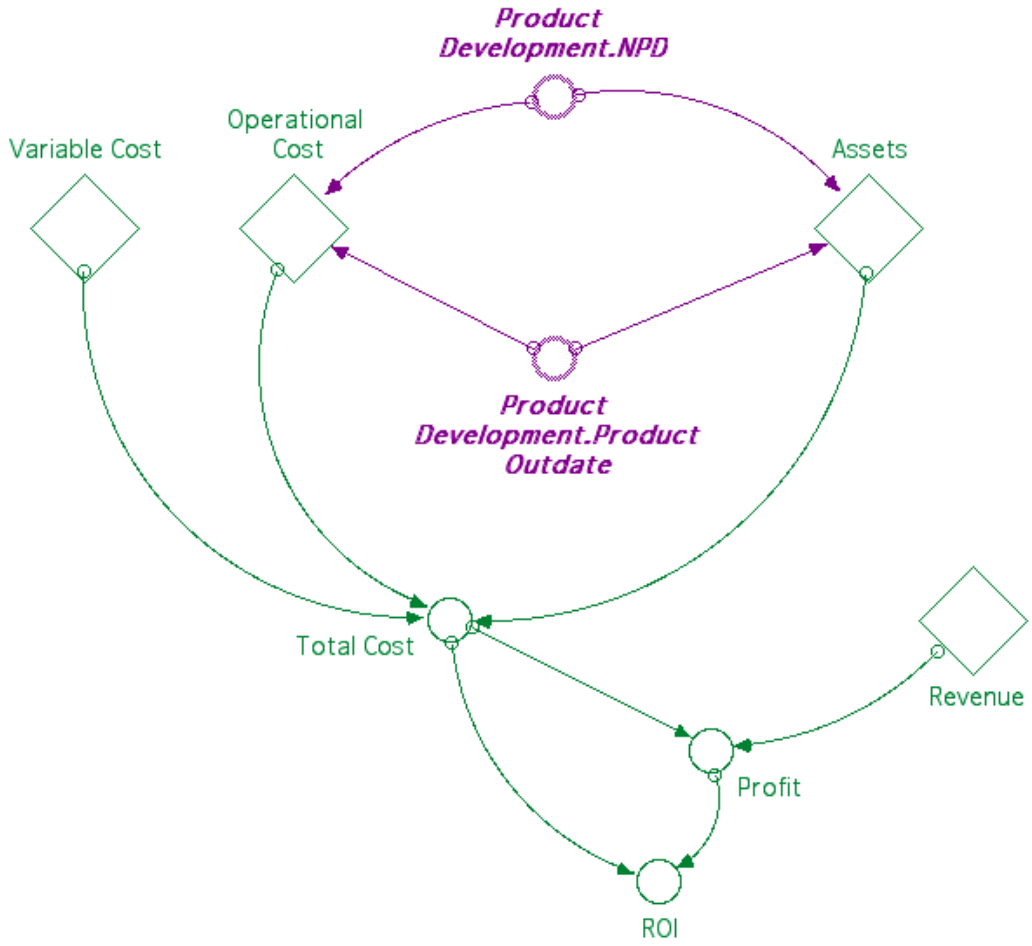
Sales_Effictivness = Advertising__Spending.Sales_Uplift_fraction+ Refrence_Sales_Effictivness
UNITS: Unitless
DOCUMENT: This variable represents the firm's sales effectiveness in obtaining orders.
Units = Unitless

Switch_Infinite_Capcity = 0
UNITS: Unitless
DOCUMENT: The variable is a switch to control the effect of current production capacity on sales fulfillment rate when needed.
Unit = Unitless
The variable can be switch by simulation user between 0 and 1

Target __Dela y = 1
UNITS: months (mo)
DOCUMENT: This variable represent the time delay that firm target not to exceed before fulfilling the order, this delay represent the perceived acceptable delay by the customer.
Units = Months
This variable is standardized at a level of 1 month

4. Financial Submodule

This Submodule represents the financial results of current firm operation, including costs, depreciation, revenue profit and return on investment.



- Profit = Revenue_2-Total_Cost
  UNITS: US dollars per month (USD/mo)
  DOCUMENT: This Variable Represent the firm Profit
  Units = USD/month
- ROI = Profit/Total _Cost
  UNITS: Unitless
  DOCUMENT: This Variable represent the Firms general Return on Investment
  Units = USD/ Month
- Total_Cost = Operation__Cost+Depreciation_Rate+Direct_Cost
  UNITS: US dollars per month (USD/mo)

DOCUMENT: This variable represent the firm's total cost, which include Total Direct cost, Operation Cost and Depreciation
Units = USD/ Month

Financial Performance.Assets:

Assets_2(t) = Assets_2(t - dt) + (Acquire_Assets - Assets__Reduction__Rate) *
dt
INIT Assets_2 = 500000
UNITS: US Dollars (USD)
DOCUMENT: This Variable represent the value of the accumulated assets
Units = USD
Initial Value = 500,000 USD
INFLOWS:
Acquire_Assets = Average_Assets__Per_New_Product* Product__Development.NPD
UNITS: US dollars per month (USD/mo)
DOCUMENT: This variable represent the rate at which firm accumlate new assets
Units = USD/month
OUTFLOWS:
Assets__Reduction__Rate = Depreciation_Rate+ Reduced_Assets_of__Terminated _Productds UNITS: US dollars per month (USD/mo)
DOCUMENT: This variable represent the rate at which firm Depreciate current assets
Units = USD/month

Average_Assets__Per_New_Product = 1000000

UNITS: US Dollars/products (USD/products)
DOCUMENT: This Variable Represent the Average Assets acquired per new product. Units = USD/ Product
This Variable is standardized at 1,000,000 USD per new product

- Average_Assets__Per_Product = Assets_2/Product__Development.Products
  UNITS: US Dollars/products (USD/products)
  DOCUMENT: This variable represent the average value of assets per products. Units = USD/ Product

Depreciation_Fraction = .08
UNITS: 1/month (1/mo)
DOCUMENT: This variable represent the average fraction at which the assets is depreciated
Units = 1/ month
This variable is standardized at 8% which represent average Depreciation of 12.5 year per asset.

Depreciation_Rate = Assets_2*Depreciation_Fraction
UNITS: US dollars per month (USD/mo)
DOCUMENT: This variable represent the total amount of depreciation. Units = USD/ Month

Reduced_Assets_of__Terminated_Productds = Average_Assets__Per_Product* Product__Development.Product_Outdate
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent reduction of assets as a result of current level of prodcuts termination
Units = USD/ Month

Financial Performance.Operational Cost:

Operation___Cost(t) = Operation_____Cost(t - dt) + (Increase_Opretation_Cost - Decrease_Operation_Cost) * dt
INIT Operation___Cost = 50000
UNITS: US dollars per month (USD/mo)
DOCUMENT: This variable represent the time the total indirect operation cost the firm pay monthly, include service departments like accounting and HR and which cannot be allocated directly on certain product.
Units USD/month
Intial Value 50,000 USD/Month
INFLOWS:

Increase_Opretation_Cost = Product__Development.NPD* Marginal_Operation_Cost__Per_Product
UNITS: usd/mo^2
DOCUMENT: This Variable represent the rate which the firm increase new operation cost a month, for example by renting new building or employing for new job.
Units = USD/ Month^2 (USD per month each month) OUTFLOWS:

Decrease_Operation_Cost = Marginal_Operation_Cost__Per_Product* Product__Development.Product_Outdate
UNITS: usd/mo^2
DOCUMENT: This Variable represent the rate which the firm decrease current operation cost a month, for example

by termination rent building contract or canceling current job.
Units = USD/ Month^2 (USD per month each month)

Marginal_Operation_Cost__Per_Product = 20000
UNITS: US Dollars/products-months (USD/products-mo)
DOCUMENT: This variable represent the marginal operation of adding or removing a product.
Units = USD/Month-product
This Variable is standardized at 20,000 USD/ month per product

Financial Performance.Revenue:

Recent__Revenue(t) = Recent____Revenue(t - dt) + (Change_in _____Recent_Revenue) *
dt
INIT Recent__Revenue = 170000
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the firm's recent revenue, this is the revenue achieved in the last period of budgeting.
Units = USD/ Month
Initial Value = 170,000 USD/ Month
INFLOWS:

Change_in__Recent_Revenue = (Revenue_2-Recent__Revenue)/ Revenue__Reporting_Delay
UNITS: usd/mo^2
DOCUMENT: This variable represent the rate of change in recent revenue as a a result of new level of revenue and reporting delay.
Units = USD/mon^2

Price = 10
UNITS: US Dollars/units (USD/unit)
DOCUMENT: This Variable Represent the Average Price per Unit
Units = USD/ Unit
This Variable is standardized at a level of 10 USD/ Unit

Revenue_2 = Sales.Sales__Fulfillment_Rate*Price
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represents the achieved sales revenue
Units = USD/ Month

Revenue__Reporting_Delay = 3
UNITS: months (mo)
DOCUMENT: A one quarter-year delay is assumed in the budgeting process. Units = Months
This variable is standardized on 3 months

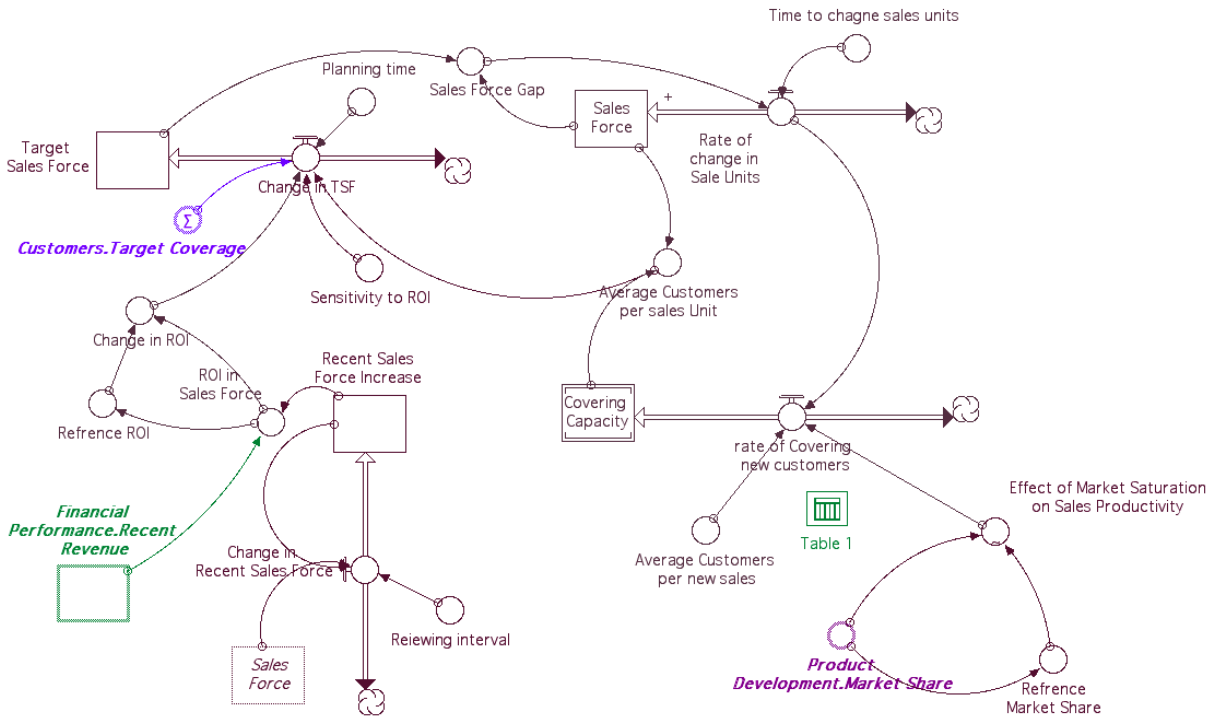
Financial Performance.Variable Cost:

Direct_Cost = Direct_Cost__Per_Unit*Sales.Sales__Fulfillment_Rate
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the Direct cost total direct cost for all the sales fulfilled in the last month
Units = USD/ Month

Direct_Cost __Per_Unit = 5
UNITS: US Dollars/units (USD/unit)
DOCUMENT: This Variable represent the The Direct cost per unit
Units = USD/ Unit
This variable is standardized at 5 USD/units

5. Sales Force Sub-Module

This Sub-module represents the dynamics of managing sales force capacity utilization and acquisition



Covering__Capacity(t) = Covering__Capacity(t - dt) + (rate_of_Covering__new_customers) * dt
INIT Covering__Capacity = 8000
UNITS: customers (customer)
DOCUMENT: This Variable represent total number of customers that can be reached by the current sales force.
Unit = Customers
Intial Value = 8000 Customers

INFLOWS:

rate_of_Covering__new_customers = Rate_of_change_in__Sale_Units* Average_Customers__per_new_sales* Effect_of_Market_Saturation_on_Sales_Productivity
UNITS: customer/mo
DOCUMENT: This variable represent the rate of change in covering new customers.
Units = Customers / month

Recent_Sales_Force_Increase(t) =
Recent_Sales_Force_Increase(t - dt) +
(Change_in__Recent_Sales_Force) * dt
INIT Recent_Sales_Force_Increase = 2
UNITS: employees (employee)
DOCUMENT: This Variable Represent the recent Sales Force Increase
Units = employees
Initial value 2 Sales Units

INFLOWS:

- Change_in__Recent_Sales_Force =
(Sales_Force-
Recent_Sales_Force_Increase)/Reie
wing_interval UNITS: employee/mo
DOCUMENT: This variable represent the change in recenet Sales Force
Units = employees/ month

Sales_Force(t) = Sales_Force(t - dt) + (Rate_of_change_in__Sale_Units) * dt

INIT Sales_Force = 2
UNITS: employees (employee)
DOCUMENT: this stock represent number of sales units, each sales unit represent sales man with his Van car.
Units: employees
Initial: 2 Sales Units

INFLOWS:

Rate_of_change_in__Sale_Units =
Sales_Force_Gap/
Time_to_chagne_sales_units
UNI
TS:
empl
oyee
/mo
DOCUMENT: This rate represent the average change in sales units per period, such change can occur by recruiting new sales units or by dismissing current sales unit
unit =
employees
per month

Target__Sales_Force(t) = Target__Sales_Force(t - dt) + (Change_in_TSF) * dt

INIT Target__Sales_Force = 4
UNITS: employees (employee)
DOCUMENT: This Variable represent the targeted Sales force as planned by entrepreneur
Units = employees
Intiail value = 4 employees (sales units)

INFLOWS:

Change_in_TSF = Round((Customers.Target_Coverage/ Average_Customers_per_sales_Unit)*Change_in_ROI^Sensitivity_to_ROI)/ Planning_time
UNITS: employee/mo
DOCUMENT: This variable represent the change rate in targeted sales force
Units = Employees per Month

Average_Customers_per_sales_Unit = Covering__Capacity/Sales_Force
UNITS: customers/employees (customer/employee)
DOCUMENT: This variable represent the average customers covered per sales units. Units = Customers per employee

Average_Customers__per_new_sales = 4000
UNITS: customers/employees (customer/employee)
DOCUMENT: This Variable represent average customers covered by new hire of sales units.
Units = customers/ employee

This Variable is standardized at a level of 4000 Customers per Employee, as according to the case single sales man in average cover 200 retailers where in average every retailer cover 20 customers.

- Change_in_ROI = ROI_in__Sales_Force/Refrence_ROI
  UNITS: Unitless
  DOCUMENT: This Variable represent the recent change in ROI as a result of changing sales force
  Units = Unitless

Planning_time = 1
UNITS: months (mo)

DOCUMENT: This variable represent time needed to decide on target change
Units = Month
This Variable is standardized on 1 month

Refrence_Market_Share = init(Product__Development.Market_Share) UNITS: Unitless
DOCUMENT: This Variable represent standard market share as a refrence point
Units = Unitless
Intial Value = 15% market share

Refrence_ROI = init(ROI_in__Sales_Force)
UNITS: employee-mo/usd (employee-mo/usd)
DOCUMENT: This variable represent the standard return on investment in sales force
Units = Employee-month/usd (usd per month return from each new employee)

Reiewing_interval = 6
UNITS: months (mo)
DOCUMENT: This variable represent the average time interval between planning review to the sales force
Units = months
this variable is standardized at 6 months

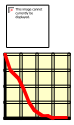
ROI_in__Sales_Force = Recent_Sales_Force_Increase/ Financial__Performance.Recent__Revenue
UNITS: employee-mo/usd (employee-mo/usd)
DOCUMENT: This variable represent the return on investment in sales force
Units = Employee-month/usd (usd per month return from each new employee)

Sales_Force_Gap = Target__Sales_Force-Sales_Force
UNITS: employees (employee)
DOCUMENT: This Variable represent the gap between target sales force and current sales force

Units = employees

Sensitivity_to_ROI = .05
UNITS: Unitless
DOCUMENT: This variable represent the entrepreneur sensitivity to change in ROI
units = unitless
This variable is standardized on .05

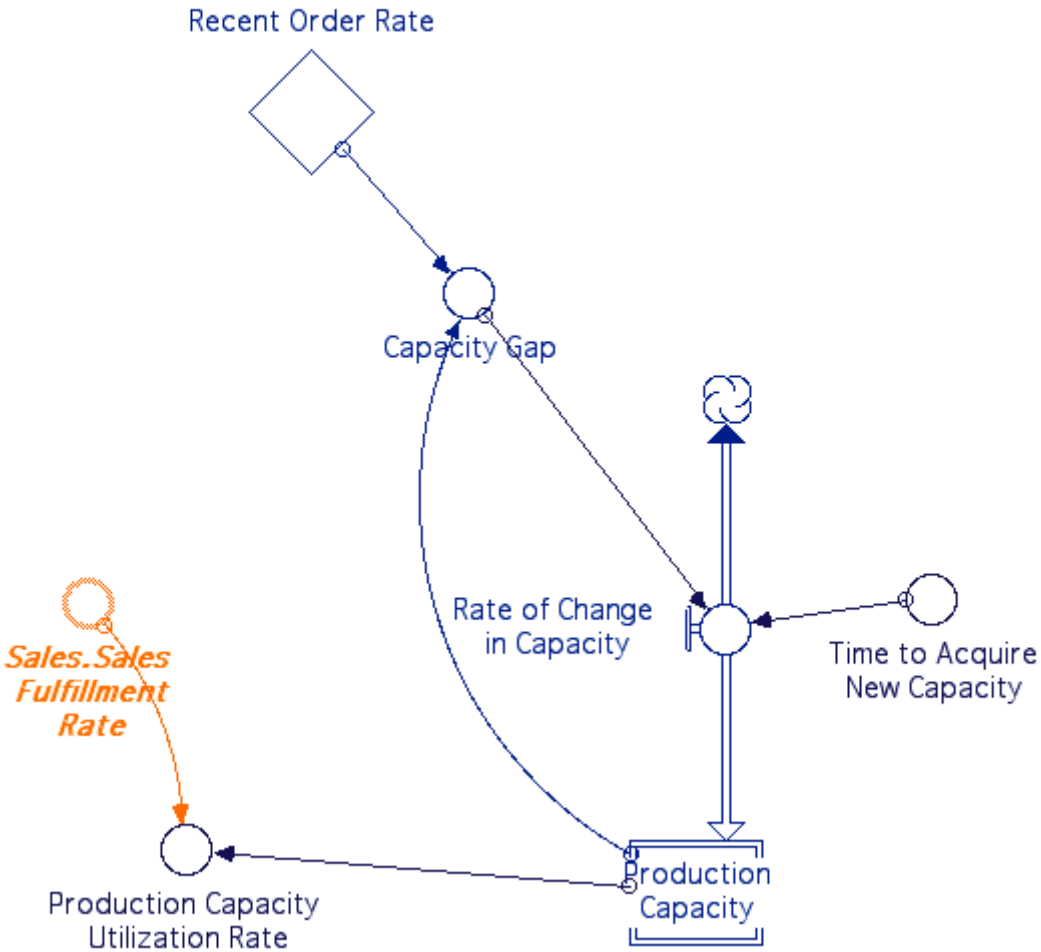
DOCUMENT: This variable represent the time needed to recruit and train new sales in case of increasing sales units, and the time needed to dismiss sales units include notice period.
Units = Months
This variable is standardized on the level of 3 months



Effect_of_Market_Saturation_on_Sales_Productivity = GRAPH(Product__Development.Market_Share/Refrence_Market_Share)
(0.00, 0.99), (0.2, 0.836), (0.4, 0.759), (0.6, 0.648), (0.8, 0.511), (1.00, 0.43), (1.20, 0.374), (1.40, 0.374), (1.60, 0.347), (1.80, 0.33), (2.00, 0.33)
UNITS: Unitless
DOCUMENT: This variable represent graphically the effect of Market Saturation on the ability of new sales unit added to cover customers, the purpose of using this variable is to prevent unrealistic sharp discontinuity in covering customers, this method have been suggested by Sterman (2000 page 530)
Units = Unitless
F(0) = 1 F(∞) = 0

6. Production Capacity Submodule

This Sub-module represents the dynamics of managing utilization and acquisition of production capacity.



Production_Capacity(t) =
Production_Capacity(t - dt) +
(Rate_of_Change__in_Capacity) * dt
INIT Production_Capacity = 10000
UNITS: unit/mo
DOCUMENT: This variable represent the firm's production capacity per month
Units = Units/ month
Intial value = 10000 units a month

INFLOWS:

Rate_of_Change__in_Capacity =
Delay(Capacity_Gap,6)/
Time_to_Acquire_New_Capacity
UNITS: unit/mo^2
DOCUMENT: This Variable represents the rate of change in production capacity
Units = Units/month^2 (units per month change per month)

Capacity_Gap = If (Recent__Order_Rate > Production_Capacity) THEN Recent__Order_Rate- Production_Capacity
ELSE
0
UNITS: unit/mo
DOCUMENT: This variable represent the gap between curent orders rate, and firm's production capacity to fulfill this orders
Units = Units/month

Production_Capacity__Utilization_Rate = Sales.Sales__Fulfillment_Rate/ Production_Capacity
UNITS: Unitless
DOCUMENT: This variable represent production utilization rate
Units = unitless

Time_to_Acquire_New_Capacity = 3
UNITS: months (mo)
DOCUMENT: This variable represent the time needed to acquire production capacity
(buy new machines)
Units = Month
This variable is standarized at 3 months

Production Capacity.Recent Order Rate:

Recent__Order_Rate(t) = Recent____Order_Rate(t - dt) +
(Change_AOR) * dt
INIT Recent__Order_Rate = 7000
UNITS: unit/mo
DOCUMENT: This variable represent recently reported sales orders rate
Units = units/month
Initial value is 7000 units a month

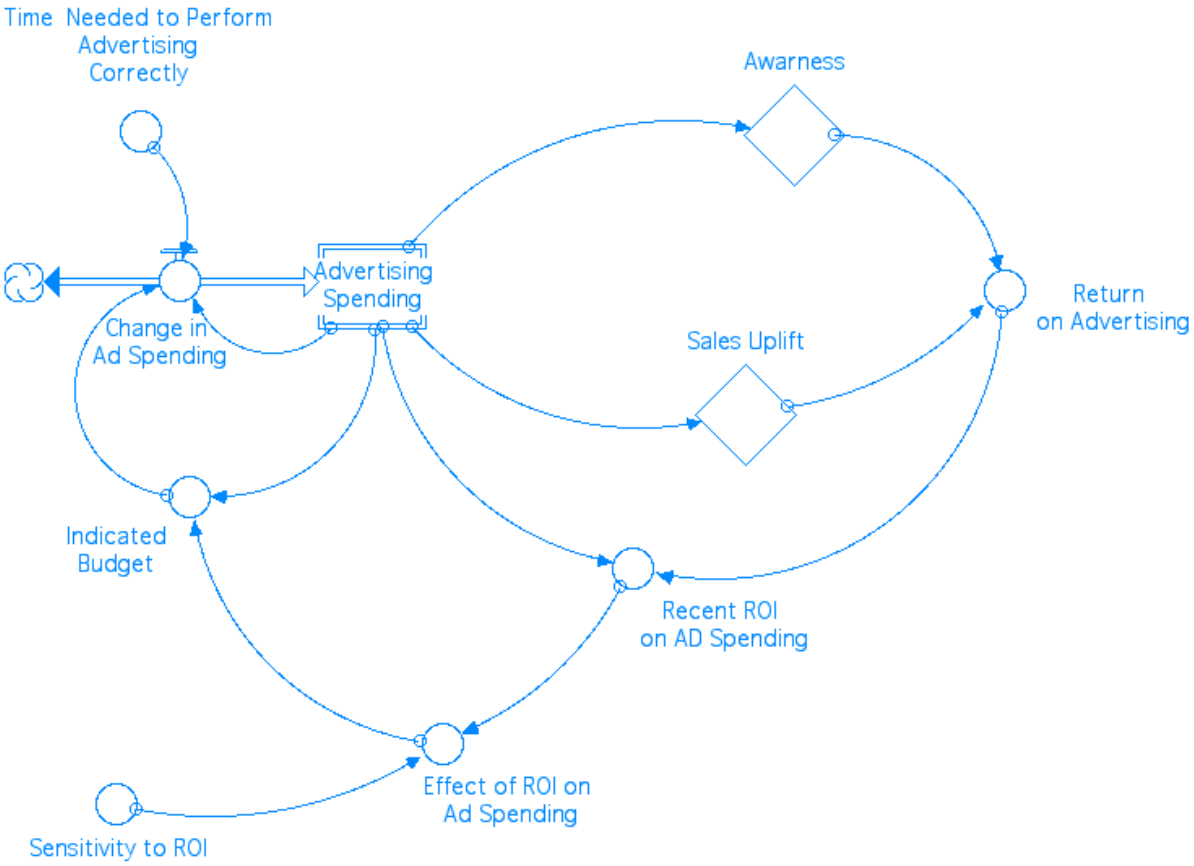
INFLOWS:

Change_AOR = (Sales.Orders__Acquiring_Rate-
Recent__Order_Rate)/ Time_to_Gain_confidence_in_Orders
UNITS: unit/mo^2
DOCUMENT: This variable represent the rate of change in
recenet order value.
Units = Unit/mo^2 (Units/month change each month)

Time_to_Gain_confidence_in_Orders = 6
UNITS: months (mo)
DOCUMENT: This variable represent the average period the entrepreneur consider to calculate sustainable order rate
Units = Months
This variable is standardized at 6 months

7. Advertising Submodule

This Sub-module represent the dynamics of optimizing advertising spending, and the effect of Uncertainty, internal information delay and limited know how on the ROI in Advertising



Advertising_Spending(t) = Advertising_Spending(t - dt) + (Change_in_____Ad_Spendir
dt
INIT Advertising_Spending = 10000
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the level of advertising spending the firm budget
Units = USD/ Month
Intial Value = 10,000
INFLOWS:

- Change_in__Ad_Spending = (Indicated_Budget-Advertising_Spending)/Time__Needed_to_Perform_Advertising_Correctly
  UNITS: usd/mo^2
  DOCUMENT: This Variable Represent the rate of change in Advertising Spending Budget, which is changing as result of the

recent level of advertising effectiveness, and the time needed to perform advertising correctly.
Units = USD/ Month

- Effect_of_ROI_on__Ad_Spending =
Recent_ROI__on_AD_Spending^Sensitivity_to_ROI UNITS: Unitless
DOCUMENT: This Variable represent the effect of change of ROI as a result of
Advertising spending on the Indicated Budget
Units = Unitless

- Indicated_Budget = Advertising_Spending*Effect_of_ROI_on__Ad_Spending
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the new level of advertising spending, which is perceived by the entrepreneur as more rewarding level as a result of recent change in ROI spending.
Units = USD/ Month

- Recent_ROI__on_AD_Spending =
Return__on_Advertising/Advertising_Spending
UNITS: Unitless
DOCUMENT: This Variable represent the ROI as a result of Advertising spending
Units = Unitless

- Return__on_Advertising =
Return_from_Awarness+Return_from_Sales_Uplift
UNITS: US dollars per month (USD/mo)
DOCUMENT: This represent the return on Advertising achieved from both the effect of advertising increasing awareness, and sales uplift
Units = USD/Month

- Sensitivity_to_ROI = .5
UNITS: Unitless
DOCUMENT: This variable represent the entrepreneur sensitivity to change in ROI, to response accordingly by changing spending level, the more the entrepreneur is sensitive to change to ROI, the faster he will response and the more steep the spending curve will be.
This variable is a control variable that User of simulation can change to test the effect of several levels of Sensitivity on Investment level.
Units = Unitless
Initial value = .5

Time__Needed_to_Perform_Advertising_Correctly = 1
UNITS: months (mo)
DOCUMENT: This Variable represent the effect of Firm's "know-how" in advertisign, as it measure how many months is needed to deploy advertising budget correctly.
This variable is a control variable that User of simulation can change to test the effect of several levels of know-how
Units = Months
Initial value =1 month

Advertising Spending.Awarness:DOCUMENT: This is a Decision Submodule
represent the relation between Advertising Spending and Customers Awarness

Fraction__Awarness = Refrence_effect_of_Ad_spending_on_Awarness* Effect_of__Ad_Spending_on_Awarness
UNITS: Unitless
DOCUMENT: This variable represent the fraction of potntial adaptors who gain interest in firm's product as a result of being exposed to the advertising.
Units = Unitless


Rate_of_Interested_customers_from_advertising = Recent_interested_from_Ad/ time_achieve_awarness
UNITS: customer/mo
DOCUMENT: This Variable Represnent the rate at which Customers gain awarness as a result of recent advertising.
Units = Cusomters/month


Recent_Adaptors__from_Ad = (Customers.Adaptors/ Customers.Potential__Adaptors)*Recent_interested_from_Ad
UNITS: customers (customer)
DOCUMENT: This variable represent the recent changes in adaptors as a result of change in advertising.
Unts = Customers


Recent_interested_from_Ad = Customers.Potential__Adaptors* Fraction__Awarness
UNITS: customers (customer)
DOCUMENT: This Variable represent the recent change in customers gaining interest every month as a result of change in advertising spending
Units = Customers/month

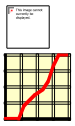

Refrence_effect_of_Ad_spending_on_Awarness = .02
UNITS: Unitless

DOCUMENT: This Variable represent a refrence value for effect of Spending on awarness fraction
Units = Unitless
This variable were standarized at .02

Return_from_Awarness = Recent_Adaptors__from_Ad*Revenue_per_Adoptor
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the Recent return gained as a result of recent change in Advertising
Units = USD/ month

Revenue_per_Adoptor =
Financial__Performance.Recent__Revenue/
Customers.Adaptors
UNITS: US Dollars/customer-mo (USD/customer-mo)
DOCUMENT: This Variable represent average revenue achieced per customer. Units = Usd/Customer-month

time_achieve_awarness = 1
UNITS: months (mo)
DOCUMENT: This variable represent time needed to acquire Interested Customers as a result of advertising spending
Units = Months
This Variable is standarized on the rate of 1 Month



Effect_of__Ad_Spending_on_Awarness =
GRAPH(Advertising_Spending/
Refrence_Advertising_Spending)
(0.00, 0.5), (0.2, 0.5), (0.4, 0.525), (0.6, 0.72), (0.8, 0.81), (1.00, 0.885), (1.20,
0.975), (1.40, 1.08), (1.60, 1.33), (1.80, 1.46),
(2.00, 1.50) UNITS: Unitless
DOCUMENT: This variable represent graphicalyt the Effect of Advertising Spending change on Awarness. this variable constrain the effectiveness of advertising to a realstic levels by smoothing the maximum and minimum effect of the advertising on sales uplift.This variable represen
Units = Unitless
F(-∞)= .5. F(1)=1, F(∞) = 1.5

Advertising Spending.Sales Uplift:DOCUMENT: This is a Decision Submodule
represent the relation between Advertising Spending and the Sales

Marginal_Sales_Uplift =
Sales.Accessible__Demand*Sales_Uplift_fraction
UNITS: unit/mo
DOCUMENT: This Variable Represent change in sales units sold as a result of recent change in sales uplift.
Units = Units/ Month

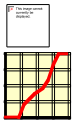
Refrence_Advertising_Spending =
init(Advertising_Spending) UNITS: US dollars
per month (USD/mo)
DOCUMENT: This variable represent a refrence level of advertising spending
Units = USD/Month

Refrence_Effect_of__Budget_on_Sales_Uplift = .05
UNITS: Unitless

DOCUMENT: This Variable represent a refrece value for the sales uplift. Units = Unitless
This variable were standarized at .05

Return_from_Sales_Uplift = Financial__Performance.Price*Marginal_Sales_Uplift
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the chang in Sales Value gained as a result of recnt change in Advertising.
Unts = USD/Month

Sales_Uplift_fraction =
Refrence_Effect_of__Budget_on_Sales_Uplift*
Effect_of__Budget_on_Sales_Uplift
UNITS: Unitless
DOCUMENT: This Variable represent the advertising effect on sales order rate, which the percentage of acceessible demand that can be gained as a resule of increasing advertising spending
Units = Unitless

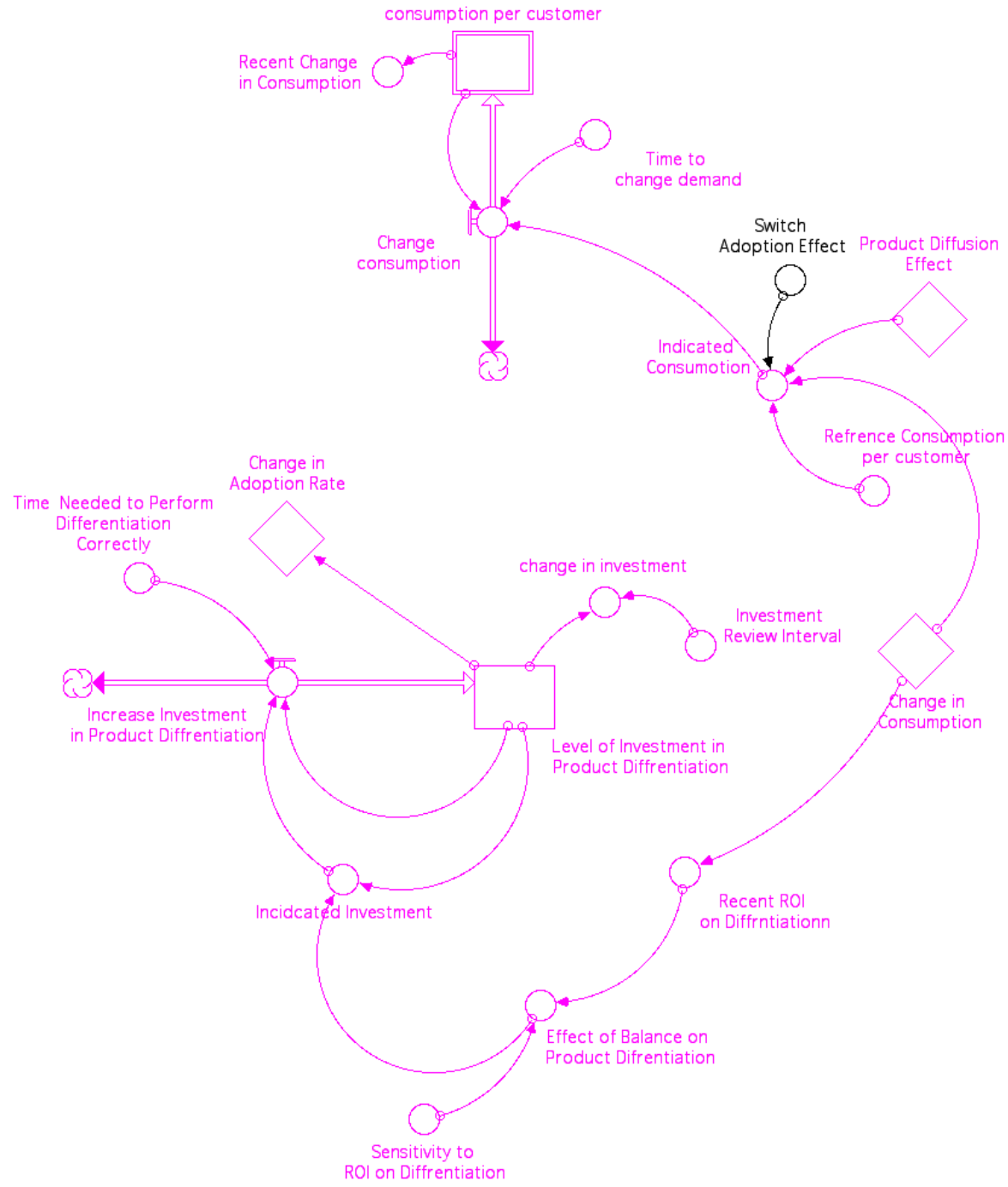


Effect_of__Budget_on_Sales_Uplift =
GRAPH(Advertising_Spending/
Refrence_Advertising_Spending)
(0.00, 0.5), (0.2, 0.5), (0.4, 0.525), (0.6, 0.72), (0.8, 0.81), (1.00, 0.885), (1.20, 0.975), (1.40, 1.08), (1.60, 1.33), (1.80, 1.46), (2.00,
1.50) UNITS: Unitless
DOCUMENT: This variable represent graphicalyt the Effect of Advertising Spending change on Sales Uplift. this variable represent constraing the effectiveness of advertising to a realstic levels by smoothing the maximum and minimum effect of the advertising on sales uplift.This variable represen
Units = Unitless
F(-∞)= .5. F(1)=1, F(∞) = 1.5

8. Differentiation Submodule

This Sub-module represent the dynamics of optimizing Investment in different differentiation activities including increasing product quality, variety, adding new features or acquiring new technology.

The dynamics of differentiation include its effect on adoption and consumption and the effect of Uncertainty, internal information delay and limited know how on in level of investment in Differentiation.



consumption_per_customer(t) = consumption_per_customer(t - dt) + (Change_consumption) * dt
INIT consumption_per_customer = 2.5
UNITS: units/customers-months (unit/customer-mo)
DOCUMENT: This Variable represents the average consumption per customer. Units = Units/ Customer-month
Intial Value: 2.5 Units per month for a customer
INFLOWS:

- Change__consumption = (Indicated_Consumotion-consumption_per_customer)/Time_to__change_demand UNITS: unit/customer-mo^2
  DOCUMENT: This Variable represent the rate at which consumption per customer change, as affected by change in differentiation and market maturity. Units = Units/ Customer-month^2

Level_of_Investment_in_Product_Diffrentiation(t) = Level_of_Investment_in_Product_Diffrentiation(t - dt) + (Increase_Investment_in_Product_Diffrentiation) * dt
INIT Level_of_Investment_in_Product_Diffrentiation = 5000
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the current level of investment in Product Differentiation activities, including investing in quality, features, variety and technology. This level of investment differ according to the perceived return on investment.
Units = USD/month
Initial Value = 5000 USD/month
INFLOWS:

- Increase_Investment_in_Product_Diffrentiation = (Incidcated_Investment-Level_of_Investment_in_Product_Diffrentiation)/Time__Needed_to_Perform_Differentiation_Correctly
  UNITS: usd/mo^2
  DOCUMENT: This Variable represent the rate at which the entrepreneur change the current level of investmenet in Product Diffrentiation activities
  Units = USD/month^2

change_in_investment = Delay(Level_of_Investment_in_Product_Diffrentiation, Investment__Review_Interval)
UNITS: US dollars per month (USD/mo)

DOCUMENT: This Variable represent the recent change in investment in diffrentiation, this reporting value is affected by the Investment Review time Interval
Units = USD/month

Effect_of_Balance_on_Product_Difrentiation =
Recent_ROI__on_Differentiation^
Sensitivity_to__ROI_on_Diffrentiation
UNITS: Unitless
DOCUMENT: This Variable represent the effect of change of DiffrentiationROI on Indicated Budget
Units = Unitless

Incidcated_Investment =
Level_of_Investment_in_Product_Diffrentiation*
Effect_of_Balance_on_Product_Difrentiation
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the new level of Investment in Differentiation, which is perceived by the entrepreneur as more rewarding level as a result of recent change in ROI spending.
Units = USD/ Month

Indicated__Consumption = If Switch
_____Adoptio
n_Effect= 0 Then
Refrence_Consumption_per_customer*
Effect_of_Investment_in__Diffrentiation_on_Cons
umption*
Effect_of_Adoption__Stage_on_Consumption
Else
Refrence_Consumption_per_customer*
Effect_of_Investment_in__Diffrentiation_on_
Consumption UNITS: units/customers-
months (unit/customer-mo)
DOCUMENT: This Variable represent the Indicated level of consumption as affected by change in differentiation and market maturity.
Units = Units/ Customer-month


Investment__Review_Interval = 1
UNITS: months (mo)
DOCUMENT: This variable represent the Investment review period (the period entrepreneur consider to measure change in investment)
Units = Month
This Variable is standardized at 1 month


Recent_Change__in_Consumption =
consumption_per_customer/
(Delay(consumption_per_customer,3))
UNITS: units/customers-months (unit/customer-mo)
DOCUMENT: This Variable represent the recent change in Average customer consumption
Units = USD/customer-month


Recent_ROI__on_Differentiation = ROI_due_to_change__in_consumption
UNITS: Unitless
DOCUMENT: This Variable represent the ROI as a result of recent Investment in
Differentiation
Units = Unitless


Refrence_Consumption_per_customer = 4.8
UNITS: units/customers-months (unit/customer-mo)

DOCUMENT: This Variable represent a reference value for customer consumption, assuming isolating the effect of Differentiation and market Evolution
Units = Unit/Customer-month
This variable is standardized at 4.8 units per customer/month

Sensitivity_to__ROI_on_Diffrentiation = .5
UNITS: Unitless
DOCUMENT: This variable represent the entrepreneur sensitivity to change in ROI of Diffrnetiation, to response accordingly by changing spending level, the more the entrepreneur is sensitive to change to ROI, the faster he will response and the more steep the differentiation investment curve will be.
This variable is a control variable that User of simulation can change to test the effect of several levels of Sensitivity on Investment Level
Units = Unitless
Initial value = .5

Switch__Adoption_Effect = 1
UNITS: Unitless
DOCUMENT: The variable is a switch to control the effect of Market Evolution on average consumption when needed.
Unit = Unitless
The variable can be switch by simulation user between 0 and 1

Time_to__change_demand = 6
UNITS: months (mo)
DOCUMENT: This Variable represent the time needed to realize the effect of differentiation investment on consumption
Units = Months
This Variable is standardized at 6 Months

Time__Needed_to_Perform_Differentiation_Correctly = 1
UNITS: months (mo)
DOCUMENT: This Variable represent the effect of Firm's "know-how" on Diffrentiation, as it measure how many months is needed to deploy diffrentiation budget correctly. This variable is a control variable that User of simulation can change to test the effect of several levels of know-how
Units = Months
Intial value =12 month

Diffrentiation.Change in Consumption:DOCUMENT: This is a Decision
Submodule represent the relation between Level of investment in Differentiation and the Change in Consumption

Effect_of_Consumption_On_Revenue = Financial__Performance.Recent__Revenue/ consumption_per_customer
UNITS: customers-US Dollars/units (customer-USD/unit)
DOCUMENT: This variable represent the effect of increase in consumption on the firm's revenue.
Units = Customer/USD-Unit

Effect_of_Investment_in__Diffrentiation_on_Consumption = (Level_of_Investment_in_Product_Diffrentiation/Refrence__Investment_Trend)^ sensitivity_to_Investment

UNITS: Unitless

Marginal_Return__from_Consumption = Effect_of_Consumption_On_Revenue* Delay(Recent_Change__in_Consumption,1)
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the marginal return achieved due to recent increase in consumption
Units = USD/ Month

Refrence__Investment_Trend = init(Level_of_Investment_in_Product_D iffrentiation) UNITS: US dollars per month (USD/mo)

ROI_due_to_change__in_consumption = Marginal_Return__from_Consumption/ Change_in_Investment
UNITS: Unitless
DOCUMENT: This Variable represent the recent return of investment in differentiation
Units = Unitless

sensitivity_to_Investment = .5
UNITS: Unitless

Diffrentiation.Change in Adoption Rate:DOCUMENT: This is a Decision Submodule represent the relation between Investment in Differentiation and customer's adaption rate.

Recent_Adaptors(t) = Recent_Adaptors(t - dt) + (Change_in__Recent_Adaptors) * dt
INIT Recent_Adaptors = 200
UNITS: customers (customer)
DOCUMENT: This variable represent the recent obtained in adaptors
Units = Customers
Initial Value = 200 Customers
INFLOWS:

Change_in__Recent_Adaptors = (Customers.Adaptors-Recent_Adaptors)/ Time_to_change_RA
UNITS: customer/mo
DOCUMENT: This Variable represent the change in irecent obtained adaptors
Units = Customer/ month

Diffrentiation_Effect_on_Adoption = Refrence_Diffrentiation_Effect_on_Adoption* Effect_of_Investment_in__Diffrentiation_on_Adoption
UNITS: 1/month (1/mo)
DOCUMENT: This Variable represent the effect of Investment in Differentiation on Adoption Rate

Units = 1/month

Refrence_Diffrentiation_Effect_on_Adoption = .3
UNITS: 1/month (1/mo)
DOCUMENT: This Variable represent a refrece value for the effect of Investment in
Differentiation on Adoption Rate
Units = 1/month
This variable were standardized at .3

Return_from__New_Customers = Revenue__per_Adapror*Recent_Adaptors
UNITS: US dollars per month (USD/mo)
DOCUMENT: This Variable represent the marginal revenue generated as a result of changing investment in differentiation
Units = USD / Month

Revenue__per_Adapror = Financial__Performance.Recent__Revenue/ Customers.Adaptors
UNITS: US Dollars/customer-mo (USD/customer-mo)
DOCUMENT: This Variable represents the average revenue achieved per customer. Units = USD/ Customer-month

ROI_from_Adoption = Return_from__New_Customers/change_in_investment
UNITS: Unitless
DOCUMENT: This Variable Represent the Marginal return on in vestment in
Differentiation.

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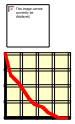
Time_to_change_RA = 1
UNITS: months (mo)
DOCUMENT: This Variable represents the review time interval
Units= Month
This Variable is standarized on the level of
1 Month.

Effect_of_Investment_in__Diffrentiation_on
_Adoption =
GRAPH(Level_of_Investment_in_Product_
Diffrentiation/
Refrence__Investment_Trend)
(0.00, 0.5), (0.2, 0.5), (0.4, 0.58), (0.6, 0.665), (0.8, 0.72), (1.00, 1.00), (1.20,
1.06), (1.40, 1.08), (1.60, 1.13), (1.80, 1.50),
(2.00, 1.50) UNITS: Unitless
DOCUMENT: This variable represents graphically the Effect of Investing In
Diffrentiation on Customers Adoption Rate.
This variable constrains the effect of Differentiation to realistic levels by smoothing the maximum and minimum effect of the Differentiation on adoption rate.
Units = Unitless
F(-∞)= .5. F(1)=1, F(∞) = 1.5

Diffrentiation.Product Diffusion Effect:DOCUMENT: This Variable represent the effect of market saturation on Average level of consumption

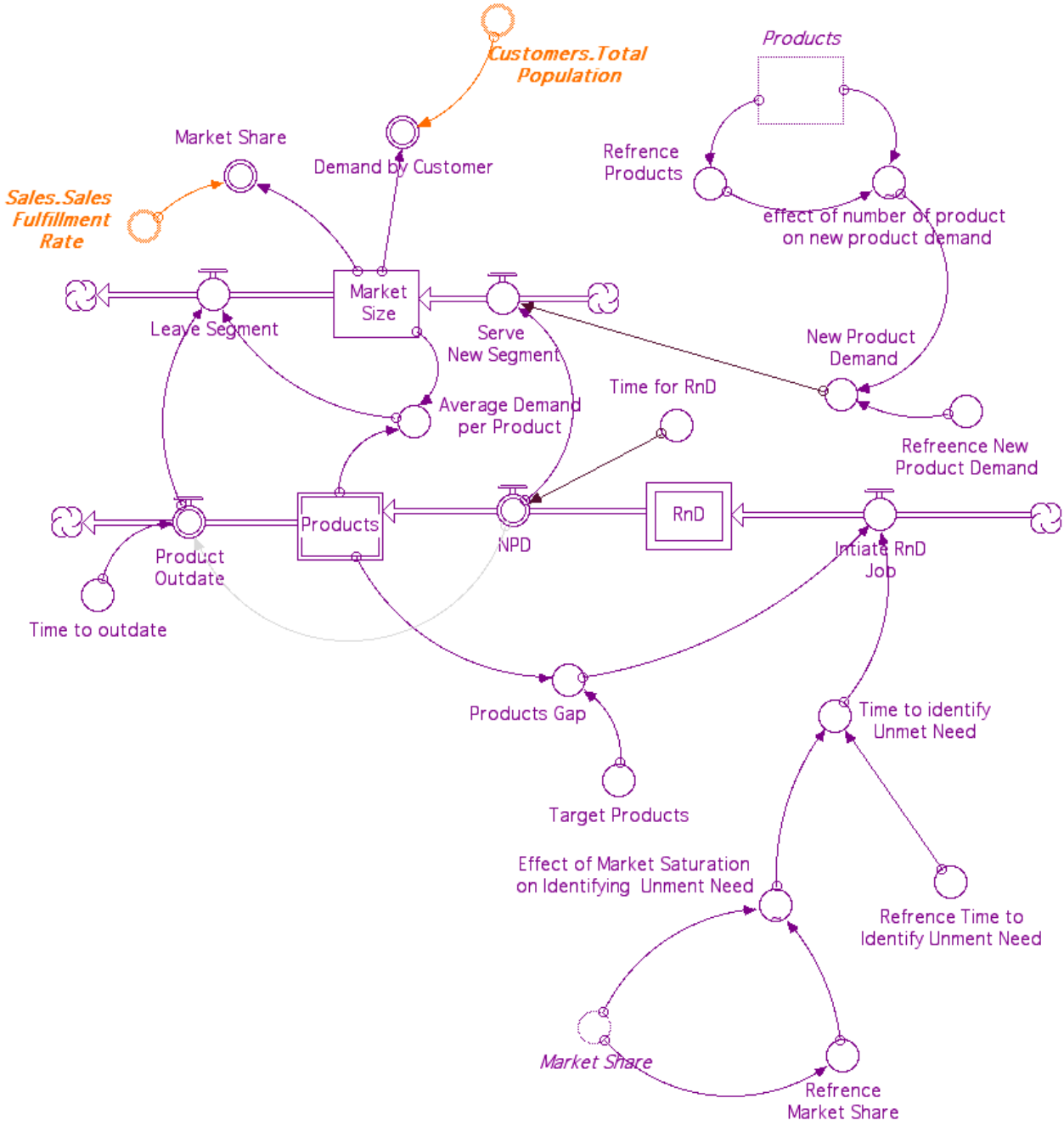
Markert_Evolution = Customers.Adaptors/Customers.Total__Population
UNITS: Unitless
DOCUMENT: This Variable represent the current level of market evolution be indication the percentage of current adaptors to the total population.
Units = Unitless



Effect_of_Adoption__Stage_on_Consumption =
GRAPH(Markert_Evolution) (0.00, 0.987), (0.03, 0.707), (0.06, 0.591), (0.09, 0.48), (0.12, 0.395), (0.15,
0.324), (0.18, 0.271), (0.21, 0.218), (0.24, 0.164), (0.27, 0.111), (0.3, 0.111)
UNITS: Unitless
DOCUMENT: This variable represent graphically the relation between Current Stage in product diffusion and average customers consumption , the purpose of using this variable is to represent the inverse relation between market evolution and customer consumption
Units = Unitless
F(0) = 1 F(∞) = 0

9. Product Development Submodule

This Submodule represents dynamics of overcoming market saturation by new product development.



Market_Size(t) = Market_Size(t - dt) + (Serve_____New_Segment - Leave_Segment) * dt

INIT Market_Size = 67000

UNITS: unit/mo

DOCUMENT: This Variable represents the current markt size of currently covered segments

Units = Units/ Month

Intial Value = 67000 Units per Month
INFLOWS:

Serve__New_Segment = NPD*New_Product__Demand
UNITS: unit/mo^2
DOCUMENT: This variable represent the rate at which firm serve new segments as a result of developing new products
Units = Units/month^2

OUTFLOWS:

Leave_Segment = Product_Outdate*Average_Demand_per_Product
UNITS: unit/mo^2
DOCUMENT: This variable represent the rate at which firm loose served segments as a result of current product termination.
Units = Units/month^2

Products(t) = Products(t - dt) + (NPD - Product_Outdate) * dt
INIT Products = 1
UNITS: products
DOCUMENT: This Variable represent the number of current products

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- NPD = CONTENTS OF OVEN AFTER COOK TIME, ZERO OTHERWISE
  !COOK TIME = Time_for_RnD
  UNITS: Products/months (Products/mo)
  DOCUMENT: This Variable represent the rate at which Research and
  Development deliver new products
  Units = Products/ Month

OUTFLOWS:

- Product_Outdate =
  Delay(NPD,Time_to_outdate)
  UNITS: Products/months
  (Products/mo)
  DOCUMENT: This Variable represents the rate at which Product terminated as a result of outdating
  Units = Products/ Month

RnD(t) = RnD(t - dt) + (Intiate_RnD_Job - NPD) * dt
INIT RnD = 1
!COOK TIME = varies
!CAPACITY = 1
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DOCUMENT: This Variable represents the current products in research and development phase.
This Variable Assume Maximum Capacity of 1
product at a time. Units = Products
Initial 1
INFLOWS:

Intiate_RnD_Job = Products_Gap/Time_to_identify_Unmet_Need
UNITS: Products/months (Products/mo)
DOCUMENT: This Variable represent the rate at which entrepreneur intiate new
New Product Research and Development
Units = Products/ Month
OUTFLOWS:

NPD = CONTENTS OF OVEN AFTER COOK TIME, ZERO OTHERWISE

!COOK TIME = Time_for_RnD

UNITS: Products/months (Products/mo)

DOCUMENT: This Variable represent the rate at which Research and

Development deliver new products

Units = Products/ Month

Average_Demand_per_Product = Market_Size/Products

UNITS: units/products-months (unit/products-mo)

DOCUMENT: This variable represent the average demand per new product

Units = Units/product-month

Demand_by_Customer = Market_Size/Customers.Total__Population

UNITS: units/customers-months (unit/customer-mo)

DOCUMENT: This Variable represent the average demand per customer from all products

Units = Units/Customer-Month

Market_Share = Sales.Sales__Fulfillment_Rate/Market_Size

UNITS: Unitless

DOCUMENT: This Variable represent the current market share of the firm

Units = Unitless

New_Product__Demand = Refreence_New__Product_Demand* effect_of_number_of_product_on_new_product_ demand UNITS: units/products-months (unit/products-mo)

DOCUMENT: This Variable represent the Marginal Demand achieved from developing new product.

Units = Units/Product-Month

Products_Gap = Target_Products-Products
UNITS: products
DOCUMENT: This variable represent the gap between target number of products and current products
Unts = products

Refreence_New__Product_Demand = 67000
UNITS: units/products-months (unit/products-mo)
DOCUMENT: This Variable represent a reference value for the Marginal Demand achieved from developing new product.
Units = Units/Products-Month

Refrence_Market_Share = init(Market_Share) UNITS: Unitless
DOCUMENT: This Variable represent a reference value for market share of the firm
Units = Unitless

Refrence_Time_to_Identify_Unment_Need = 12
UNITS: months (mo)
DOCUMENT: This variable represent a reference value for the time entrepreneur spend to identify new market opportunity.
Units = Months
This variable is standardized at the level of 12 months

Refrence__Products = init(Products)
UNITS: products
DOCUMENT: This Variable represent a reference number of products
Units = Products
Intial = 1 product

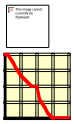
Target_Products = 5
UNITS: products
DOCUMENT: This variable represents the number of targeted products. Units = Product
This variable is standardized at 5 products, assuming entrepreneur believe 5 products is thee optimum level in the market

Time_for_RnD = 12
UNITS: months (mo)
DOCUMENT: This variable represent the current time needed from Research and Development team to develop new product
Units = month

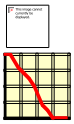
This variable is standardized at the level of 12 Months

Time_to_identify_Unmet_Need =
Refrence_Time_to_Identify_Unment_Need*
Effect_of_Market_Saturation_on_Identifying__Unmet_Need
UNITS: months (mo)
DOCUMENT: This variable represent the time entrepreneur spend to identify new market opportunity, for example identifying unmet need in certain segment.
Units = Months

Time_to_outd
ate = 60
UNITS: months (mo)
DOCUMENT: This product represent the lifespan of the products before it outdate
Units = Months
This variable is standardized at 60 months



Effect_of_Market_Saturation_on_Identifying__Unmet_Need = GRAPH(Market_Share/ Refrence_Market_Share)
(0.00, 1.50), (0.125, 1.50), (0.25, 1.36), (0.375, 1.27), (0.5, 1.16), (0.625, 1.11), (0.75, 1.04), (0.875, 1.01), (1.00, 1.00), (1.12, 0.8), (1.25, 0.665), (1.38, 0.59), (1.50, 0.535), (1.62, 0.52), (1.75, 0.52), (1.88, 0.5), (2.00, 0.5)
UNITS: Unitless
DOCUMENT: This variable represent graphically the effect of market saturation on entrepreneur ability to identify unmet need
Units = Unitless
F(-∞)= 1.5. F(1)=1, F(∞) = .5



effect_of_number_of_product_on_new_product_demand = GRAPH(Products/ Refrence__Products)
(1.00, 1.50), (1.40, 1.50), (1.80, 1.27), (2.20, 1.19), (2.60, 1.10), (3.00, 1.00), (3.40, 0.73), (3.80, 0.64), (4.20, 0.535), (4.60, 0.5), (5.00, 0.5)
UNITS: Unitless
DOCUMENT: This variable represent graphically the inverse relation between number of products already launched and the opportunity to achieve demand from launching new product.
This variable constrain the effect of launching new product to a realistic levels by smoothing the maximum and minimum effect of new product developing on achieving demand.
Units = Unitless
F(-∞)= 1.5. F(1)=1, F(∞) = .5