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OPTIMIZATION MODEL FOR CUSTOMER BEHAVIOR WITH MARS AND KYC SYSTEM

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ABSTRACT

Know You Customer System (KYC) is one of the technologies currently applied to control customer activities and verify accurate data for security and user satisfaction. Multivariate and dynamic growth of digital business is also the rise of payment technology in other words receiving Big Data which we must anticipate. This study, using MARS is a nonparametric method with the function of reducing and making optimal models in predicting each numerical computational structure in it. Results obtained Find a model for optimal coefficient values from large-scale data values. So that in determining decisions, as well as supporting business intelligence can be done appropriately.

Keywords: *Dynamic KYCP, Star-Up, Blockchain Technology, Business Canvas Model, MARS, Personal Financial Management.*

1. INTRODUCTION

Advanced innovation of business modernized (business undertaking and social endeavour) is gigantic on customers who are by and by extending in number. This is affirmed by the extending number of advantage/wages arranged business executives, growing earnestness, and extending number of sellers that have been acquired electronically, so customers have various choices to support their trade`s [1]. Financial Technology (FinTech) created as changes in people's lifestyles are at present overpowered by speedy paced information advancement customers [2]. As demonstrated by Bank Indonesia Regulation Number 19/12/PBI/2017, Fintech is the usage of cash related system development that produces new things, organizations, advancement just as strategies that influence monetary unfaltering quality, budgetary system quality, and the capability, perfection, security, and steadfastness of portion structure. Shippers are isolated into two, solitary brokers and authentic sellers [2].

In this research before to (Moyano, J. P et al 2017), Frameworks that utilization blockchain innovation to expand know-your-client (KYC) the procedure is just proposed at the theoretical level and all sharing of specific properties is taken reception by money related organizations (OJK) is troublesome. We favour and program dependent on the blockchain a framework that lessens and shares among money related organizations that work with clients KYC and furthermore permits OJK for progressively related data for clients and scatter this data among endorsed OJKs [2]. What's more, our framework Conquer a portion of the properties that contradict the reception of an answer proposed before by the OJK. Make a customized arrangement and set it up yourself that can be applied by OJK to take care of expenses KYC process without the endorsement of the example community to store client information, and where OJK shares the underlying expense of the KYC procedure just as the operational expenses for acquiring data about the most recent clients. Our framework expands the degree of security and guideline in Indonesia KYC and essentially lessen process costs for all gatherings included [3,4].

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The blockchain could similarly store bearings, as a client conduct in Fintech, for how the substance producers would be compensated for the tune or music, and how the customers can get to it [5,6]. The creative features that can be offered with blockchain development are, among others, the ability to have significantly altered organizations, whereby customer IDs, profiles, tendencies and history will be accessible at whatever point required by the customers and for every medium substance that is made, consumed, shared, proposed or also analysed, and the reasonability of media substance and organizations since the blockchain advancement can guarantee a dependable, versatile and problematic income based plan of action that can upgrade the monetary and specialized maintainability of media and administrations [7,8]. An individual dealer works their business without being established on the methodologies and conditions for setting up a legal business, while a real seller develops their business reliant on the philosophy and plans for the establishment of a combined business substance [9].

The blockchains rely upon cutting edge marks (considering cryptography) to portray the characters of the individuals in the framework [10,11]. In the Bitcoin mastermind, for instance, the wallet IDs is the one which describes the IDs of the part and, through this, someone can search for unequivocal trades and work together with him/her. Making a propelled IDs, combining the decentralized blockchain rule with character affirmation, would go about as an automated watermark, designated to each online trade [12,13]. This would allow relationship to check character on each trade constantly, essentially discarding distortion [14,15]. Blockchain's decentralized philosophy can give control back to customers, preventing blackmail and boosting trust all the while [16,17]. Regardless, the blockchain approach on character the board is fairly restricted in scope as it doesn't give full-improved character the officials convenience and potential results to interface with outcast off-chain organizations. This is an assessment subject which is dealt with in the current paper [18,19].

The assessment to be done bright lights on the utilization of Know Your Customer Principles (KYCP) are norms applied by financial help establishments to find the character of customers. The headway of cash related development for portion trades, similarly as electronic based mechanical advancement, especially in the field of arrangements, continues making shifting [20,21]. Associations moreover need to prepare for desire in choosing plausible business given the relentlessly close competition [22,23]. Along these lines, a Dynamic KYCP framework is relied upon to deal with the confusing issues related to Fintech customer lead. Taking into account this establishment, the arrangement of the issue that must be settled with economics of different customer direct that are spread over the North Sumatera district – Indonesia [2,24]. Weakness rising up out of legitimate business managers by considering portions of Business Metrics related to the contrasting behaviours of customers. Building a Business Canvas Model in choosing contenders for various shippers and billers [25,26]. With this excellent assessment, it is believed that another technique will be gotten the chance to unravel information related to Fintech customer direct by utilizing Knowledge Acceleration using Business Metrics [2,27].

2. RESEARCH ACHIEVED MODEL

Assets Data right now data obtained through an assistant database that has been gotten from the Fintech application which we call "Customer Monitoring at FinTech". Regardless, multi-assortment data will be presented, yet at the present time, seeing the case of unstructured data, it becomes composed data and a while later the data will be planned by the method used to adjust the information as spread out in the data base assessment [28,29]. Coming up next are multivariate data as mechanized portions made by customers and pros who direct business electronically [30]. Depictions are gathered subject to customer associations and genuine competition with mechanized organizations.

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Table 1. Literature Review Big Data and Business Intelligence

Author	Years	Model Approaches to Big Data and Business Intelligence
G-Wilhelm Weber et al.	2019	Liberated Social Entrepreneur. Using Business Metrics: MiG port Refugee Big Data Analytics. With a Note on Ability and Disability
Parra-Moyano et al	2019	Optimised and dynamic KYC system based on blockchain technology
Graczyk-Kucharska, et al.	2019	Modelling Problems in a Regional Labour Market in Poland with MARS and ANN
Szafrański et al.	2019	Modelling preventive acquisition of human resources
Yung-Heng et al.	2019	Skills of negotiating and building relations in profit generation in companies
Bravo et al.	2019	Influence of the organization on development of competences
Shvetsova	2018	Linking the educational paradigm with production paradigm
Graczyk- Kucharska et al.	2018	Model of competency management in a network of cooperating employers
Spychała et al.	2017	Development of competence models on the basis of model job positions
Fatma Yerlikaya-Ozkurt et al.	2016	A Hybrid Computational Method Based on Convex Optimization for Outlier Problems: Application to Earthquake Ground Motion Prediction
Goliński et al.	2016	Modelling communications on competence needs on labour market
Pakize Taylan et al.	2014	An approach to the mean shift outlier model by Tikhonov regularization and conic programming
Ayse Özmen et al.	2013	The new robust conic GPLM method with an application to finance: prediction of credit default
G-Wilhelm Weber et al.	2012	CMARS: a new contribution to nonparametric regression with multivariate adaptive regression splines supported by continuous optimization
G-Wilhelm Weber et al.	2012	Predicting default probabilities in emerging markets by new conic generalized partial linear models and their optimization
Pakize Taylan et al.	2010	On the foundations of parameter estimation for generalized partial linear models with B-splines and continuous optimization
Ennis	2008	Adjustment of competence models to selected business models
Coll et al.	2006	Growing importance of IT and customer service competences
Garvare et al.	2001	Employee competences in the improvement of company's business quality

Table 2. Description of Acquisitions and Types of Business Metrics

class (variation) shipper	Depiction
a) Foodcourt 	Area name: Mega Park Address: Jl. Chief Madlim Megakom Medan Complex Working hours: 16.00 WIB Area Type: Residential Complex and Shophouse Vendor type: Foodcourt Number of accomplices: 50 Dealers have just procured: 20 Value: 'Rp. 25,000 Turnover every day: Rp.10,000,000

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b) Caffe 	Area name: Rumah Pohon Address: Jl. Sei Belutu close to the Medan Area II University grounds, Medan Working hours: 10:00 AM Area Type: Housing Type of chant: Cafe and Hangout Centre number of shippers: 1 Shippers have just gained: 1 'Level nourishment value': IDR 25,000 Turnover every day: Rp.8,000,000

Table 2. Portrayal of acquisition is the hidden unstructured data that will be secured electronically through cutting edge portion advancement [31]. At the present time, propelled portion application was made and moreover a model of acquainting information with draw data on e-estimations for customers and help associations, so it can without quite a bit of a stretch profile any models that offer rising to tangled and genuine customer relations with sellers in making trade structures unquestionable [32,33,34].

At this moment, a model of a methodology of managing a gigantic number of customers, reality similarly augments so it needs a reasonable organization model that is legitimate and convincing with the peculiarity technique approach that is recognized in industry and general society in getting information [35,36].

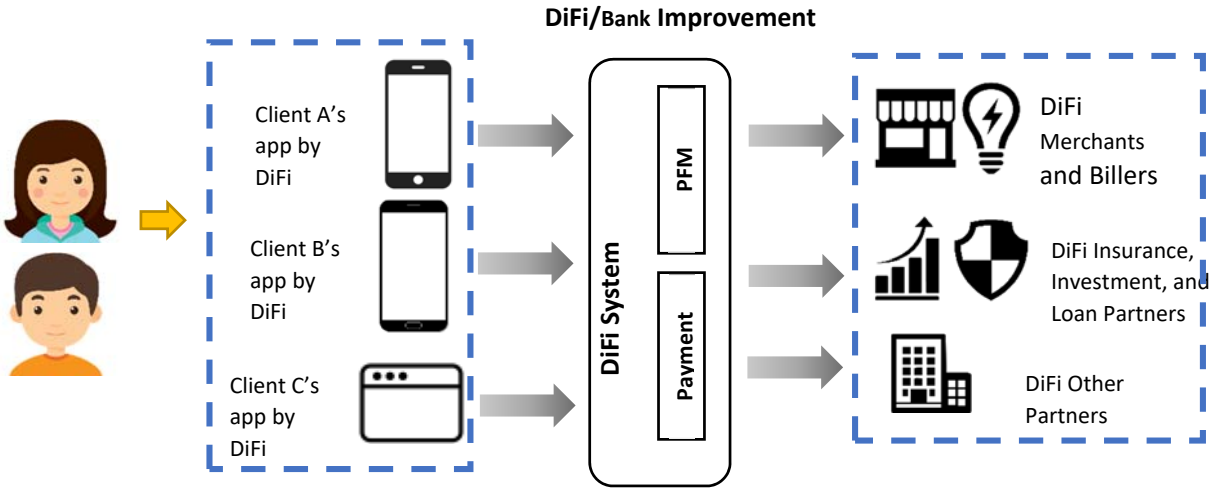

Figure 1. Manage Proses KYC Via E-Money Apps Mobile

Figure 1. Direct arrangements e-money brokers fill in as anyone might expect, specifically serving their customers as demonstrated by the measures of the structure set by the bank [37,38]. The underlying advance taken by prospective shippers is to enroll first as an associate by introducing the essential data precisely [39,40]. This data will thusly be taken care of in the association database as an ID that shows that the seller has legitimately planned by first consenting to the terms and conditions of the association [41,42]. After the selection strategy is completed, the merchant

directly has a virtual office that limits as a go between in getting virtual refund trades and virtual money related norms moved by up and coming buyers [43,44]. At this moment, character of the buyer will be viably seen by the shipper in light of the fact that the two social occasions

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unquestionably know how a great deal of the virtual markdown or virtual money will be moved to the merchant's virtual office [45,46]. The ensuing stage is the Merchant really sends the thing in the structure, entirety and moving expense agreed by the two social events.

3. RESULT AND DISCUSSION

3.1 KYC System Principles

Know Your Customer Principles (KYCP) are measures applied by financial help establishments to find the character of customers [47,48], screen customer trade practices including uncovering dubious trades and it is the dedication of cash related assistance associations to execute them. the application model was collected subject to a relevant examination in the North Sumatera region. Regardless, the periods of the strategy and customer framework that will be used here, we create a FinTech application to get customer data by e-estimations, by then we develop a delineation of the data got. Data got from Source Big Data, which is at this moment. The data model that we will use is built reliant on the data base speeding up [49,50]. From a segment of the Fintech applications that have been made, we incorporate a methodology we call "Singular Finance Management (PFM)" which infers customers can manage their own assets and can be saved by sharing the qualification from the store. The data plans that we find are uncommonly multivariate in e-estimations [51]. The seller practices that we obtained were then detached into a couple of game plans, to be explicit: Merchant and Biller data [52].

3.2 Process Current KYC System

the KYC due industriousness process has advanced from a basic custom into an exhaustive procedure administered by national establishments (*Moyano, J. P et al*, 2019).

a. Distinguish the client and check that client's personality utilizing dependable, free source reports, information, or data.
b. Distinguish the "useful proprietor", check the gainful proprietor's personality, and comprehend the possession and control structure of the client.
c. Comprehend and acquire data on the reason and proposed nature of the business relationship
d. Lead continuous due persistence on the business relationship over the span of the relationship to guarantee that the exchanges being directed are reliable with the FI's information on the client.

In this Figure 2 (*Attachment Document.* RMD.1). Know Your Customer (KYC) shapes unequivocally rely upon character the officials, and give the establishment of definitive and budgetary foundations' foe of tax avoidance tries.

Table 3.1 Customer to Merchant Demographics Using KYC

Name Merchant	Customers	Transaction
“Sate bang jon lk”	270	7.020.000
“Toko dedi lk”	235	3.307.000
“Ibrahim yusuf”	254	7.202.500
“Warung simpang tiga”	263	3.873.000
“Milala bengkel”	176	4.475.000
“Ir.one s”	184	1.280.000
“Warung tiara lk”	194	2.176.500
“Rujak Jelani”	163	3.104.001
“Mariana br sinaga”	172	1.255.000
“Abu bakar nl”	109	1.325.000
“Frans pebrian lubis”	127	1.387.000

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3.3 Multivariate Adaptive Regression Linear Spline (MARS)

Table 3.2 Method using MARS With 10 Inputs from Different Data Sets

Input	Predictor name
Y	*Uncertainty Competitive Merchant*
x_1	*Value Transaction*
x_2	*Variant Transaction*
x_3	*Date (week, mont)*
x_4	*Revenue*
x_5	*District*
x_6	*City/Regency*
x_7	*Name User*
x_8	*Virtual Account(nohp)*
x_9	*Distance Merchant*
x_{10}	*Name Merchant*

MARS is a nonparametric relapse is :

framework that doesn't make unequivocal assumptions about the essential pragmatic associations among dependent and free factors to measure the general limit of high-dimensional disputes, given the meager data.

$$[+(x - T)]_+, [-(x - T)]_+, \quad (1)$$

where [q] +: = max {0, g} and τ are univariate vertices. Each capacity is straight, with a hub at the estimation of r, and the relating pair of capacities is known as the reflected pair. Let us think about a general model of the connection between indicator factors and reactions. The objective is to fabricate the pair that is reflected for every indicator x_j (j = 1, 2, p) with the p-dimension knot $\tau_i = (\tau_{i,1}, \tau_{i,2}, \ldots. \tau_{i,p})^T$ at $x_i = (x_{i,1}, x_{i,2,\ldots.} x_{i,p})^T$ or just adjacent to each data vector $\dot{x}_i = (\dot{x}_{i,1}, \dot{x}_{i,2}, \ldots.\dot{x}_{i,p})^T (i = 1, 2,..., N)$ of the predictor. We don't lose the consensus, the presumption that $\tau_{i,j} \neq \dot{x}_{i,j}$ for all i and j, to forestall the distinction in the matter of enhancing this examination later [1]. All things considered, we can pick hub $\tau_{i,j}$ farther than the indicator esteem $\dot{x}_{i\,j}$,, on the off chance that there is a place that guarantees better information mounting [1]. After this planning, the BF assortment of research is:

$$\wp : \left\{(x_j - T)+, (T - x_j) + \mid T \in \{x_{1,j}, x_{2,j}, \ldots, x_{N,j}\},\ J \in \{1,2, \ldots, p\}\right\}, \quad (2)$$

In this way, we can speak to $f(x)$ with linear combinations which are respectively built by the set p and with the intercept θo, so that (2) takes the form.

$$y = \theta_0 + \sum_{m=1}^{M} \theta_m \psi_m(x) + \epsilon, \quad (3)$$

Here, ψ_m (m = 1, 2, M) is the BF of p or the result of at least two of these capacities, ψ is taken from a lot of direct free premise components M, and θ_m is an unknown coefficient for m-basis functions *(m =* (4)

1,2, ..., M) or for constants *1 (m = 0)*. One lot of vertices that fulfils i, j is doled out independently for each element of the indicator variable and is picked so it agrees with the degree of indicator spoke to in

the information. BF collaborations are made by increasing existing BF with shortened straight capacities including new factors. For this situation, the current BF and the recently made BF communication are utilized in the MARS approach [1]. Given that perceptions are spoken to by information $\boldsymbol{x}_i$, $\boldsymbol{y}_i$ (i = 1, 2, N), the BF to m structure can be composed as follows:

$$\psi_m(x) := \prod_{j=1}^{K_m} \left[S_{k_j^m} . \left(x_{k_j^m} - T_{k_j^m}\right)\right] +, \quad (4)$$

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where K_m is the quantity of shortened direct capacities duplicated in the BF to -*m*, $x_{K_j^m}$ is meeting the straight capacity in the - *j* intersecting the linear function in the BF to- *m*, $T_{K_j^m}$ is the hub esteem relating to the variable, $x_{K_j^m}$ and $S_{K_j^m}$ is the picked sign +1 or -1 .

(2)

$$GCV := \frac{1}{N}\frac{\sum_{i=1}^{N}\left(y_i - \hat{f}_\alpha(x_i)\right)^2}{\left(1 - \tilde{C}(\alpha)/N\right)^2} \quad (5)$$

The MARS estimation for assessing the limit model f (x) includes two sub-figurings: The stepwise forward count scans for BF and at every movement, a split that restrains the 'less sensible' standards of each possible parcel for each BF is picked [2,3]. The technique stops when the customer demonstrated Mmax regard is come to. By then, the stepwise in turn around computation begins to prevent bounty comparability by diminishing the unconventionality of the model without decreasing change in accordance with the data, and to take out from the BF model that adds to the tiniest addition in outstanding error squares at each stage, making undeniably assessed models concerning each the amount of terms, called f alpha. This examination observes that reveals some estimation unpredictability [3]. To evaluate the perfect alpha regard summarized cross-endorsement (GCV) can be used, showing a nonappearance of congruity for the MARS model.

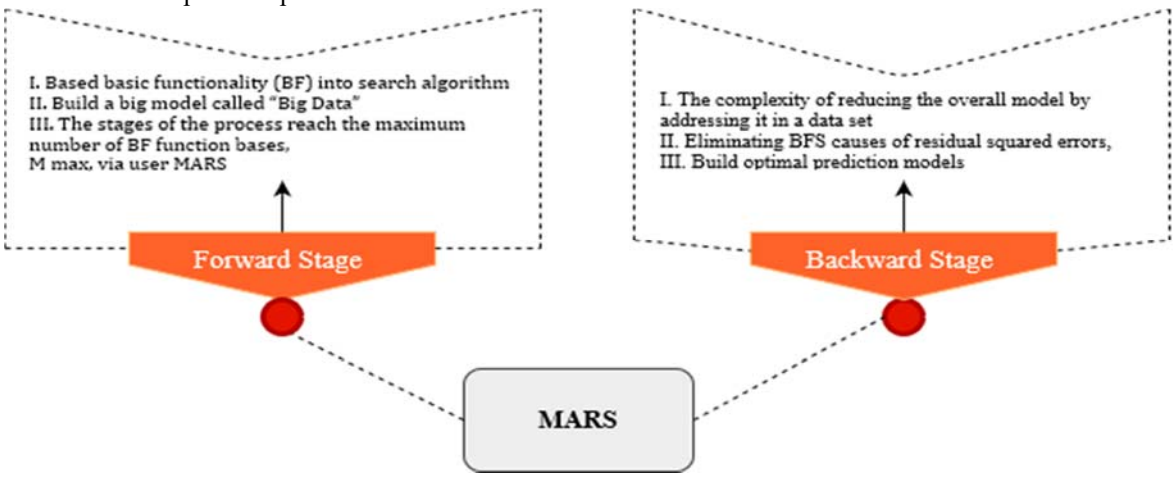

Figure 3. The two-stage process in MARS

3.4 Data Testing

Customer direct reliant on trades can be found in (*Attachment Document*. RMD.2) in table 3.3. where there are four diagrams with different characteristics. The chief chart is about normal probability, where this is the run of the mill condition of the customer. In the second outline about customer direct that scans for comparable qualities between things used by specific dealers. In the third outline about customer trades, which are shown plan trades did by the customer. In the fourth chart about, customer orders and what is done is view of solicitations that are made.

3.5 Achieved Model

Optimization Model KYC for Basis Function MARS Method:

$BF1 = max \quad \{0, x_2 - 0, 637062\}$
$BF3 = max \quad \{0{,}007, x_4 - 0, 548592\}\ BF_1$
$BF5 = max \quad \{0, x_6 - 0, 133145\}.BF_2$
$BF7 = max \quad \{0, x_4 - 0, 099381\}.BF_4$
$BF9 = max \quad \{0, x_4 + 0, 083350\}\ BF_6$

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$BF11 = max \quad \{0{,}008\ x_4\text{-}0{,}\ 033764\text{-}008\}\ BF_8$

$BF13 = max \quad \{0,\ x_{4+}0,\ 099381\}\ BF_{10}$

$BF15 = max \quad \{0,\ x_{4+}0,\ 099381\}\ BF_{12}$

$BF17 = max \quad \{0,\ x_{2+}0,\ 083350\}\ BF_{14}$

$BF19 = max \quad \{0,\ x_{2\text{-}1500}\}\ BF_{16}$

The optimization *MARS* model with the BFs above is presented in the subsequent form:

$$Y = \theta_0 + \sum_{m=1}^{M} \theta_m \psi_m(x) + \epsilon, = \text{-0, 133145-007 + 1 + BF1 – 0, 637062-007 + BF3 - 0, 548592-007 + BF5 + 0, } 133145\text{-007 + BF7 - 0, 099381-008 + BF9+ 0, 083350-008 + BF11 - 0, 033764-008 + BF13 + 0, 099381-013 + BF15+ 0, 099381-008 + BF17 + 0, 083350;}$$

Table 4. Test Results of Data Models on Customer Behaviour

Name Merchant	Coef	SE Coef	DF	T-Value	P-Value
abu bakar nl	-4,85707E+03	7624,168454	213,00	-0,637062	0,525
aneka gorengan nl	-5,75984E+03	1,04993E+04	213,00	-0,548592	0,584
apotek maju lk	1936,037942	1,94809E+04	213,00	0,099381	0,921
benny natanael sinaga	1,00877E+04	1,40428E+04	213,00	0,718354	0,473
burger bu neng lk	-4,30151E+03	1,18954E+04	213,00	-0,361611	0,718
frans pebrian lubis	-3,21412E+03	7822,073208	213,00	-0,410904	0,682
fristi cell nl	-662,311724	1,96160E+04	213,00	-0,033764	0,973
galon rendi lk	1661,866018	1,99385E+04	213,00	0,083350	0,934
Ibrahim yusuf	1,19362E+04	5512,390528	213,00	2,165339	0,031
Indomaret	-1,10332E+04	1,95353E+04	213,00	-0,564781	0,573
Ir.one s	-2,44246E+03	5780,919940	213,00	-0,422503	0,673
Kede jon nl	1,66619E+04	1,99385E+04	213,00	0,835664	0,404
Kfc adam malik medan	-8,63484E+03	1,04993E+04	213,00	-0,822419	0,412
Kfc asia mega mas medan	-1,11348E+04	1,42839E+04	213,00	-0,779537	0,437
Kfc bic mareland	-1,06348E+04	1,42839E+04	213,00	-0,744533	0,457
Kfc cemara asri medan	-6,56396E+03	1,94809E+04	213,00	-0,336944	0,736
Kfc center point medan	-8,63484E+03	1,18954E+04	213,00	-0,725897	0,469
Kfc simpang mataram medan	-1,06348E+04	1,18954E+04	213,00	-0,894030	0,372
Mariana br sinaga	-470,097856	5957,658794	213,00	-0,078906	0,937
Mie aceh andre	1936,037942	1,94809E+04	213,00	0,099381	0,921
Mie ayam palangkaraya	-2,63484E+03	1,97894E+04	213,00	-0,133145	0,894

Table 4. We create information models in Star-Up clients, to be specific by controlling dynamic clients in an extremely powerful KYC. Our result and reasonings utilize multivariate relapse to take out the decrease of enormous information into basic information to be enhanced in figuring's (*Attachment Document*. RMD.3).

4. CONCLUSION

The results of this research, the implementation of the optimization model in reducing data from the KYC System, we can predict growth based on customer behaviours that is so diverse, so the importance of this research is to anticipate, determine sustainable business decisions. The MARS method is very good for obtaining the optimum model. Value coefficients are obtained based on computational results ranging from 0.3% to 0.9% of the results obtained.

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A. *Attachment Document (RMD.1)*

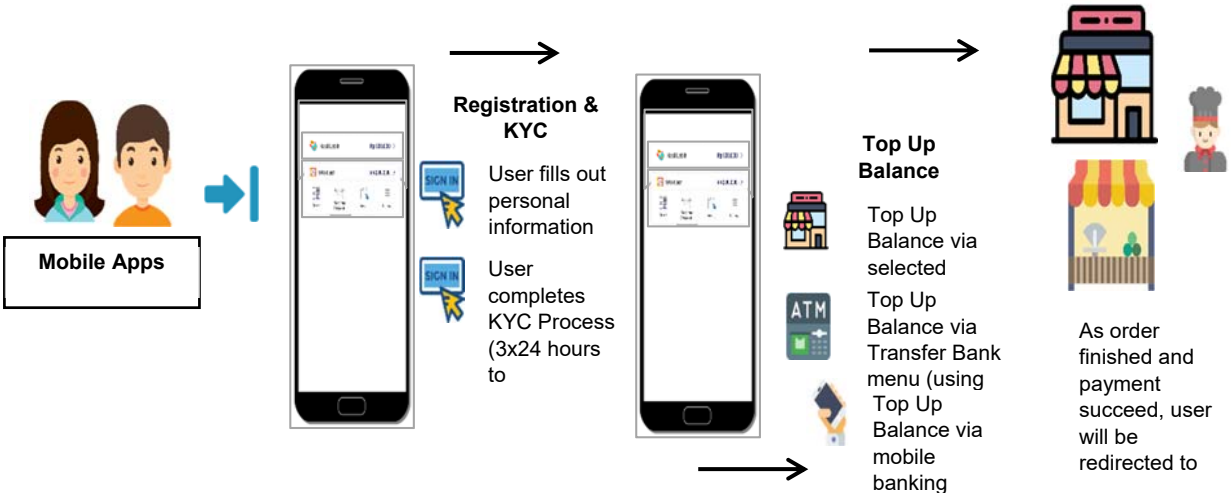

Figure 2. Identity Customer In Mobile Apps – Transaction Flow Via Apps

C. *Attachment Document (RMD.2)*

Table 3.3. Customer KYC System Ecosystem

PN	NM	S D	D	C/R	KYC
81244935850	Sate bang jon lk	Kota Matsum Iv	Medan Area	Kota Medan	"001011369760"
81235678902	Toko dedi lk	Petisah	Medan Barat	Kota Medan	"001011512542"
81229329787	Ibrahim yusuf	Petisah Tengah	Medan Petisah	Kota Medan	"001011512542"
81262465195	Warung simpang tiga	Teladan Barat	Medan Kota	Kota Medan	"001011382554"
81241988999	Milala bengkel	Limau Manis	Tanjung Morawa	Deli Serdang	"001011409081"
81217378054	Ir.one s	Kisaran Naga	Kisaran Timur	Asahan	"001011561310"

B. *Attachment Document (RMD.3)*

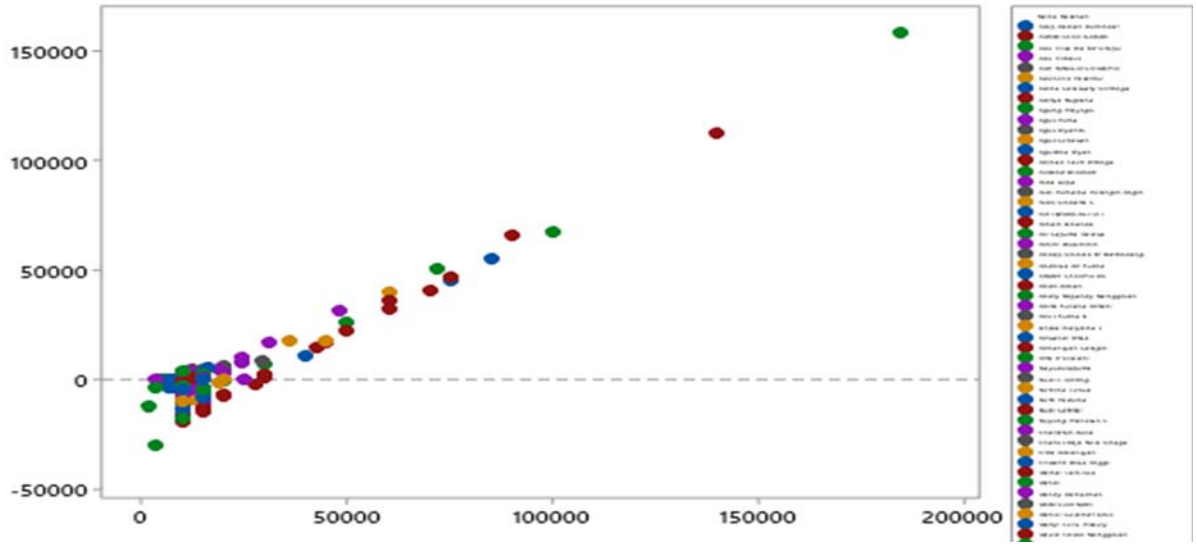

Figure 4. Competitive Growth Sustainable Business