



## Estimated Economic Growth Rate Based on Efek Decrease in PPKM Level Using Support Vector Regression Method

Daniel Setyo Cahyo Utomo<sup>1</sup>, Adi Nugroho<sup>2</sup>

<sup>1</sup>Program Studi Teknik Informatika, Universitas Kristen Satya Wacana, Salatiga, Indonesia  
Email: <sup>1</sup>672018198@student.uksw.edu, <sup>2</sup>adi.nugroho@uksw.edu

### Abstract

Economic growth is a change in economic conditions towards a better level. An increase in the value of income and production will affect the condition of a country. It can be known that the impact of Covid-19 is enough to affect economic conditions in Indonesia. Economic conditions in Indonesia are also affected by the PPKM program from the government. The bill of decreasing the PPKM level that is applied, is considered to provide an increase in the economy towards normal and better. The purpose of this study is to provide predictions and analysis of the value of future economic growth. The method used is SVR (Support Vector Regression). This method is processed using a Polynomial kernel and using MAPE (Mean Absolute Percentage Error) error accuracy. Based on research that has been carried out, the results of the value of each economic nit in the fourth quarter of 2021 and the first to fourth quarters of 2022 with a MAPE value of 3.6% which is included in the very good category. In this study, an analysis was also obtained that there will be an economic increase of 1.14% along with a decrease in the PPKM level.

**Keywords:** Economic Growth, PPKM, SVR, Polynomial, MAPE

### 1. INTRODUCTION

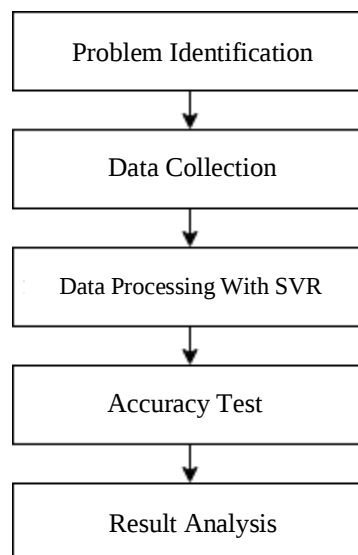
Economic growth is a change in economic conditions towards a better level. Economic growth can be attributed to the presence of an increase in the amount of production of goods and services. Slow economic growth is one of the indicators that development in one country is slow [1]. One of the indicators that can be used to assess the growth of a Country is the Gross Domestic Product (GDP) [2]. Gross Domestic Product (GDP) data is one of the important indicators to know the condition of a region in a certain period. Because the Gross Domestic Product (GDP) data is the result of real economic calculations, it is very appropriate if used as a factor that affects economic growth [3].



Economic growth in Indonesia can be categorized at a fairly good level. However, with the Covid-19 pandemic that has occurred around the world in recent years, economic development in Indonesia has been quite hampered. With this pandemic, the Government of Indonesia has implemented the PPKM program to suppress the spread of the virus. Along with the decline in the PPKM level, economic growth in Indonesia began to improve. By making economic growth forecasting, it can provide gambaran to Indonesia's economic condition in the future. It can also be used to make strategic decisions in production and consumption in the future. The result of the process that will be carried out is the result of prediction and analysis of the increase in the economic level from the effect of the decrease in the PPKM level.

The method that can be used is Support Vector Regression (SVR). Support Vector Regression (SVR) is the result of the development of the Support Vector Machine (SVM) method by adding a regression method so that it can be used for forecasting like the regression method in statistical proximity [4]. This method matches as much data as possible with lines as well as pays attention to margins as large as epsilon. The basic idea of SVR is the same as SVM which is to minimize errors and create hyperplanes that maximize margins [5]. The advantage of SVR is the ability to overcome non-linear data problems with kernel tricks and can overcome overfitting problems where the resulting model only produces a good model for training data and not for testing data [6]. The kernel function has the purpose of mapping the input vector to a high-dimensional feature space so that the data allows it to be processed using the SVR model [7].

## 2. METHODS



**Figure 1.** Stages of penelitian

In this study, several stages will be carried out to produce good results. Broadly speaking, it will be divided into six stages, namely: 1) Problem Identification. 2) Data Collection. 3) Data Processing By SVR Method. 4) MAPE Error Accuracy Test. 5) Analysis of Results. The stages carried out in this study can be seen in **Figure 1**.

**2.1 Problem Identification**

At the first stage will be carried out the identification of the problem. The problems that are being around and are in contact with everyday life are about the economy.

**2.2 Pengumpulan Data**

At the data collection stage, data was obtained from the Web of the Central Statistics Agency <https://www.bps.go.id/>. The selection of data is because it is felt that it matches several factors needed to carry out the analysis.

**2.3 Data Processing with SVR**

The Support Vector Regression (SVR) method is a fraction of the Support Vector Machine (SVM) method. The SVR method can be applied to regression cases because it will learn patterns from actual results and data [8]. According to (Scholkopf and Smola, 2012), the SVR method aims to find a function  $f(x)$  as a hyperplane (dividing line) in the form of a regression function which corresponds to all input data by making an error ( $\epsilon$ ) as small as possible [9]. Since this method will result in mapping the input vector to a high-dimensional feature space, it can be provided with a regression line function as an optimal hyperplane as follows [10].

$$f(x) = w^T \varphi(x) + b \quad (1)$$

Because the Support Vector Regression (SVR) method requires a kernel function, in this study the kernel function used was a polynomial kernel. The polynomial kernel is a kernel thanks to a non-linear category. This kernel has the feature to map data to the dimensions of the feature space in which a special parabolic curve pattern will be formed [11]. This kernel is suitable for data and the training results are normalized [12]. Polynomial kernel parameters consist of cost, and degree. The equation of a polynomial kernel is:

$$K(x, x^1) = ((x, x^1) + 1)^d \quad (2)$$

## 2.4 Testing Accuracy and Error MAPE

Mean Absolute Percentage Error (MAPE) is a large percentage of average error. MAPE calculations fall into the absolute or absolute category. The way MAPE works is by finding the error of each period by dividing the actual value of that period. The smaller the percentage generated by MAPE, the more accurate the forecasting results will be. The MAPE equation is as follows:

$$MAPE = \frac{\sum_{t=1}^n \left| \frac{A_t - F_t}{A_t} \right| 100}{n} \quad (3)$$

A = Actual data

F<sub>t</sub> = Forecasting data to t

N = Besarnya forecasting data

According to Lewis (1982), MAPE values can be interpreted into 4 categories, namely:

- 1) < Result 10% = Excellent
- 2) Yield 10-20% = Good
- 3) Yield 20-50% = Reasonable
- 4) Result > 50% = Inaccurate

## 2.5 Result Analysis

Analysis of the results will be carried out to see the percentage increase in the economic level in the last quarter of 2021 and the whole of 2022.

## 3 RESULTS AND DISCUSSION

### 3.1 Problem Identification

The problem identification stage in this study will discuss:

- 1) The decline in the economic level from the impact of Covid 19.
- 2) Human needs for distribution, production and consumption.
- 3) Reduction of employment with the presence of an economic downturn.
- 4) People's anxiety with the increase in ppkm levels to the economy.

### 3.2 Data Collection

In the data collection process, data will be taken from the website of the Central Statistics Agency (BPS) [13]. The data obtained will be filtered and sorted into 17 units, namely:

- 1) Unit 1 : Includes all data values from agriculture, forestry, and electricity.
- 2) Unit 2 : Covers all data values from mining and mining.
- 3) Unit 3 : Includes all data values from the industry.
- 4) Unit 4 : Includes the entire data value of the procurement of electricity and gaxles.
- 5) Unit 5 : Includes all data values from water procurement, waste management, waste and recyclingu lang.
- 6) Unit 6 : Includes the entire data value of the instruction k.
- 7) Unit 7 : Covers the entire value data of large trade and retail, car repair and bicyclem otor.
- 8) Unit 8 : Includes the entire data value of the transport and warehousing p.
- 9) Unit 9 : Includes the entire data value of the provision of accommodation and meals minum.
- 10) Unit 10 : Includes all data values from information and communication.
- 11) Unit 11 : Includes all data values of financial services and asuransi.
- 12) Unit 12 : Includes the entire data value of the real estate.
- 13) Unit 13 : Includes all data values of the company's services.
- 14) Unit 14 : Covers the entire value of data from government administration, defense and social security wajib.
- 15) Unit 15 : Includes all data values of the education service.
- 16) Unit 16 : Includes all data values of health services and sosial activities.
- 17) Unit 17 : Includes the entire data value of the other j asa.

The following is the data obtained in the 2015-2021 period :

**Table 1.** Data Obtained in 2015 and 2016

| Unit | Year 2015 |            |             |            | Year 2016 |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 373325    | 409907     | 433272      | 338703     | 395458    | 442484     | 462893      | 370763     |
| 2    | 227523    | 228468     | 217356      | 208347     | 203805    | 210169     | 221849      | 255046     |
| 3    | 579828    | 602876     | 615005      | 621183     | 617397    | 635488     | 644069      | 648249     |
| 4    | 29429     | 32892      | 32592       | 34922      | 32148     | 34882      | 36699       | 38615      |
| 5    | 2058      | 2141       | 2156        | 2191       | 2177      | 2217       | 2237        | 2279       |
| 6    | 273054    | 282761     | 299389      | 321881     | 306119    | 311274     | 327034      | 343175     |
| 7    | 363094    | 381908     | 394050      | 393826     | 393073    | 408834     | 416503      | 417000     |
| 8    | 132577    | 139950     | 152119      | 153818     | 149872    | 152632     | 170510      | 171980     |
| 9    | 82644     | 84557      | 86189       | 88166      | 88503     | 89809      | 91428       | 93316      |
| 10   | 97645     | 100100     | 103339      | 104933     | 106343    | 110708     | 114719      | 117420     |
| 11   | 110846    | 110051     | 119328      | 124175     | 124958    | 128137     | 133302      | 133810     |

|    |       |        |        |        |        |        |        |        |
|----|-------|--------|--------|--------|--------|--------|--------|--------|
| 12 | 79797 | 81270  | 82682  | 83853  | 86267  | 87175  | 88195  | 88852  |
| 13 | 45469 | 46681  | 48496  | 49622  | 51360  | 52007  | 53494  | 54763  |
| 14 | 99646 | 108687 | 118103 | 122947 | 111395 | 120262 | 120220 | 124614 |
| 15 | 84344 | 94391  | 100735 | 108142 | 94403  | 105388 | 103632 | 113922 |
| 16 | 28368 | 30116  | 31283  | 33424  | 31541  | 32644  | 32849  | 35067  |
| 17 | 45476 | 46789  | 48546  | 49770  | 50925  | 51969  | 53564  | 54970  |

**Table 2.** Data obtained 2017 and 2018

| Unit | Year 2017 |            |             |            | Year 2018 |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 438520    | 468865     | 489399      | 391180     | 465397    | 502398     | 519473      | 413354     |
| 2    | 255965    | 246535     | 250497      | 276557     | 284732    | 293755     | 315501      | 304999     |
| 3    | 661774    | 682513     | 698586      | 696839     | 710352    | 729874     | 754221      | 753004     |
| 4    | 38826     | 39254      | 41769       | 42491      | 41935     | 43573      | 45242       | 45890      |
| 5    | 2303      | 2334       | 2376        | 2425       | 2406      | 2452       | 2536        | 2630       |
| 6    | 329889    | 340378     | 358918      | 381328     | 367838    | 374679     | 397582      | 422199     |
| 7    | 425402    | 437815     | 453517      | 452130     | 460221    | 477819     | 499868      | 493905     |
| 8    | 167955    | 177806     | 195536      | 193933     | 189188    | 200807     | 202530      | 205253     |
| 9    | 94424     | 95954      | 97546       | 99089      | 100182    | 102215     | 104250      | 106063     |
| 10   | 123693    | 129104     | 130302      | 130617     | 133303    | 135897     | 144298      | 145440     |
| 11   | 138290    | 141673     | 147135      | 144105     | 149196    | 151306     | 157498      | 158316     |
| 12   | 92776     | 95482      | 96539       | 97462      | 99255     | 100594     | 102189      | 103976     |
| 13   | 56867     | 58705      | 60728       | 61917      | 63452     | 66004      | 68037       | 69602      |
| 14   | 113449    | 121547     | 125627      | 138720     | 123782    | 133546     | 134568      | 149790     |
| 15   | 100944    | 108618     | 111717      | 125859     | 109541    | 117453     | 120454      | 134300     |
| 16   | 34424     | 35415      | 36443       | 38550      | 37479     | 38780      | 39612       | 42199      |
| 17   | 57121     | 58926      | 60984       | 62228      | 63837     | 66306      | 68472       | 69961      |

**Table 3.** Data obtained in 2019 and 2020

| Unit | Year 2019 |            |             |            | Year 2020 |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 478506    | 537752     | 546817      | 449668     | 503503    | 569757     | 571588      | 470238     |
| 2    | 294001    | 292756     | 282798      | 280359     | 267420    | 231508     | 239875      | 254739     |
| 3    | 759018    | 773712     | 798054      | 788811     | 783622    | 732565     | 773434      | 778422     |
| 4    | 44179     | 44742      | 47286       | 48909      | 45934     | 41995      | 45701       | 46112      |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| 5  | 2627   | 2664   | 2665   | 2781   | 2760   | 2778   | 2837   | 2929   |
| 6  | 406888 | 410946 | 431255 | 452652 | 419714 | 389446 | 412959 | 430540 |
| 7  | 498968 | 513180 | 527752 | 520479 | 517642 | 473246 | 499555 | 505027 |
| 8  | 209334 | 220898 | 225141 | 226175 | 202881 | 131884 | 171185 | 183751 |
| 9  | 106919 | 108790 | 110804 | 113699 | 109742 | 84184  | 97103  | 103201 |
| 10 | 149414 | 154112 | 160842 | 162164 | 166869 | 171870 | 177588 | 179512 |
| 11 | 164203 | 162502 | 170213 | 174516 | 184403 | 163902 | 168371 | 179390 |
| 12 | 107547 | 108953 | 110858 | 112098 | 112980 | 112854 | 113934 | 114013 |
| 13 | 72078  | 75061  | 77759  | 79387  | 78466  | 67629  | 72978  | 75183  |
| 14 | 133855 | 147290 | 139234 | 151244 | 141389 | 140111 | 143629 | 155047 |
| 15 | 118549 | 127592 | 133260 | 142975 | 129855 | 130378 | 139195 | 149969 |
| 16 | 41439  | 43055  | 44130  | 46116  | 46911  | 45346  | 52813  | 56079  |
| 17 | 72363  | 76176  | 79395  | 81069  | 80516  | 68742  | 75702  | 77609  |

Table 4. Data obtained 2021 and 2022

| Unit | Year 2021 |            |             |            | 2022      |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 524832    | 596259     | 618569      | -          | -         | -          | -           | -          |
| 2    | 303403    | 337953     | 413148      | -          | -         | -          | -           | -          |
| 3    | 787424    | 805622     | 828448      | -          | -         | -          | -           | -          |
| 4    | 46701     | 46035      | 47532       | -          | -         | -          | -           | -          |
| 5    | 2936      | 2986       | 3001        | -          | -         | -          | -           | -          |
| 6    | 428662    | 422463     | 449342      | -          | -         | -          | -           | -          |
| 7    | 519885    | 546386     | 563513      | -          | -         | -          | -           | -          |
| 8    | 169661    | 175953     | 168854      | -          | -         | -          | -           | -          |
| 9    | 101513    | 103570     | 97656       | -          | -         | -          | -           | -          |
| 10   | 181819    | 185264     | 188894      | -          | -         | -          | -           | -          |
| 11   | 181861    | 184423     | 184410      | -          | -         | -          | -           | -          |
| 12   | 114310    | 116310     | 118299      | -          | -         | -          | -           | -          |
| 13   | 74750     | 75452      | 73690       | -          | -         | -          | -           | -          |
| 14   | 137524    | 157132     | 127335      | -          | -         | -          | -           | -          |
| 15   | 128821    | 140989     | 132752      | -          | -         | -          | -           | -          |
| 16   | 49558     | 52171      | 60846       | -          | -         | -          | -           | -          |
| 17   | 76927     | 77396      | 76494       | -          | -         | -          | -           | -          |

The data listed in **Table 1** to **Table 4** is data obtained from the website of the Central Statistics Agency. There is data for 2015-2021. The 2021 data is still in the third Quarter so that the fourth Quarter prediction and the prediction in 2022 are used as testing targets.

### 3.3 Data Processing With SVR

The data that has been prepared will go through the SVR calculation process using the Polynomial kernel where in this kernel will be given provisions such as in equation (2) with  $c = 100$ , and  $\text{degree} = 2$ . In this process, the following data estimates are produced which are mapped in **Table 5** to **Table 8**:

**Table 5.** Predicted results of the years 2015 and 2016

| Unit | Year 2015 |            |             |            | Year 2016 |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 407390    | 409907     | 412843      | 416199     | 419975    | 424170     | 428786      | 433821     |
| 2    | 226454    | 228467     | 230612      | 232888     | 235295    | 237834     | 240504      | 243305     |
| 3    | 600392    | 607637     | 615005      | 622494     | 630106    | 637840     | 645696      | 653673     |
| 4    | 30116     | 31379      | 32592       | 33755      | 34868     | 35932      | 36946       | 37911      |
| 5    | 2077      | 2103       | 2130        | 2158       | 2187      | 2216       | 2247        | 2278       |
| 6    | 297016    | 302952     | 308881      | 314805     | 320722    | 326633     | 332538      | 338436     |
| 7    | 379389    | 385603     | 391887      | 398239     | 404662    | 411153     | 417715      | 424345     |
| 8    | 140741    | 146611     | 152118      | 157262     | 162041    | 166457     | 170509      | 174198     |
| 9    | 82501     | 84484      | 86372       | 88165      | 89863     | 91466      | 92974       | 94387      |
| 10   | 97644     | 100194     | 102835      | 105569     | 108394    | 111311     | 114319      | 117420     |
| 11   | 113065    | 116208     | 119327      | 122423     | 125494    | 128541     | 131564      | 134562     |
| 12   | 79198     | 81001      | 82780       | 84535      | 86266     | 87974      | 89657       | 91316      |
| 13   | 44878     | 44878      | 48434       | 50140      | 51797     | 53406      | 54967       | 56480      |
| 14   | 108848    | 110839     | 112792      | 114706     | 116582    | 118420     | 120220      | 121981     |
| 15   | 92477     | 94391      | 96307       | 98225      | 100146    | 102069     | 103994      | 105921     |
| 16   | 29970     | 30358      | 30793       | 31277      | 31810     | 32391      | 33020       | 33698      |
| 17   | 45044     | 46788      | 48499       | 50177      | 51821     | 53431      | 55009       | 56553      |

**Table 6.** Predicted results of the year 2017 and 2018

| Unit | Year 2017 |            |             |            | Year 2018 |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 439277    | 445152     | 451447      | 458162     | 465297    | 472852     | 480826      | 489221     |

| p-ISSN: 2656-5935 |        |        | <a href="http://journal-isi.org/index.php/isi">http://journal-isi.org/index.php/isi</a> |        |        | e-ISSN: 2656-4882 |        |        |
|-------------------|--------|--------|-----------------------------------------------------------------------------------------|--------|--------|-------------------|--------|--------|
| 2                 | 246238 | 249303 | 252499                                                                                  | 255826 | 259285 | 262875            | 266596 | 270450 |
| 3                 | 661773 | 669995 | 678340                                                                                  | 686806 | 695394 | 704104            | 712937 | 721891 |
| 4                 | 38826  | 39691  | 40506                                                                                   | 41271  | 41987  | 42654             | 43270  | 43837  |
| 5                 | 2310   | 2343   | 2377                                                                                    | 2411   | 2447   | 2483              | 2520   | 2558   |
| 6                 | 344329 | 350215 | 356095                                                                                  | 361970 | 367837 | 373699            | 379555 | 385404 |
| 7                 | 431045 | 437814 | 444653                                                                                  | 451561 | 458539 | 465586            | 472702 | 479888 |
| 8                 | 177523 | 180484 | 183081                                                                                  | 185315 | 187185 | 188691            | 189834 | 190613 |
| 9                 | 95705  | 96928  | 98056                                                                                   | 99088  | 100026 | 100869            | 101617 | 102269 |
| 10                | 120612 | 123896 | 127272                                                                                  | 130739 | 134299 | 137950            | 141693 | 145528 |
| 11                | 137537 | 140488 | 143415                                                                                  | 146317 | 149196 | 152050            | 154880 | 157687 |
| 12                | 92952  | 94563  | 96151                                                                                   | 97715  | 99254  | 100770            | 102262 | 103730 |
| 13                | 57944  | 59360  | 60728                                                                                   | 62047  | 63318  | 64541             | 65716  | 66842  |
| 14                | 123704 | 125388 | 127034                                                                                  | 128642 | 130212 | 131743            | 133236 | 134691 |
| 15                | 107851 | 109783 | 111716                                                                                  | 113652 | 115591 | 117531            | 119474 | 121419 |
| 16                | 34424  | 35198  | 36021                                                                                   | 36892  | 37812  | 38780             | 39796  | 40861  |
| 17                | 58063  | 59540  | 60984                                                                                   | 62394  | 63771  | 65114             | 66424  | 67701  |

Table 7. 20 19 and 20 20 prediction results

| Unit | Year 2019 |            |             |            | Year 2020 |            |             |            |
|------|-----------|------------|-------------|------------|-----------|------------|-------------|------------|
|      | Quarter I | Quarter II | Quarter III | Quarter IV | Quarter I | Quarter II | Quarter III | Quarter IV |
| 1    | 498035    | 507269     | 516923      | 526997     | 537491    | 548405     | 559739      | 571492     |
| 2    | 274434    | 278550     | 282797      | 287176     | 291686    | 296328     | 301101      | 306006     |
| 3    | 730968    | 740166     | 749487      | 758930     | 768495    | 778182     | 787991      | 797922     |
| 4    | 44354     | 44821      | 45239       | 45607      | 45925     | 46193      | 46412       | 46581      |
| 5    | 2596      | 2636       | 2676        | 2717       | 2759      | 2802       | 2846        | 2890       |
| 6    | 391247    | 397084     | 402915      | 408740     | 414559    | 420371     | 426178      | 431978     |
| 7    | 487143    | 494468     | 501862      | 509325     | 516858    | 524460     | 532132      | 539873     |
| 8    | 191028    | 191079     | 190767      | 190091     | 189051    | 187648     | 185881      | 183750     |
| 9    | 102827    | 103289     | 103657      | 103930     | 104107    | 104190     | 104177      | 104070     |
| 10   | 149455    | 153473     | 157583      | 161785     | 166079    | 170465     | 174942      | 179511     |
| 11   | 160469    | 163227     | 165961      | 168671     | 171357    | 174019     | 176657      | 179271     |
| 12   | 105174    | 106594     | 107990      | 109363     | 110711    | 112035     | 113336      | 114612     |
| 13   | 67920     | 68950      | 69932       | 70865      | 71750     | 72587      | 73376       | 74116      |
| 14   | 136107    | 137485     | 138824      | 140126     | 141389    | 142613     | 143800      | 144948     |
| 15   | 123366    | 125315     | 127267      | 129220     | 131176    | 133134     | 135094      | 137057     |
| 16   | 41974     | 43135      | 44345       | 45604      | 46910     | 48266      | 49669       | 51121      |

---

17    68944    70154    71330    72473    73583    74659    75702    76711

---

**Table 8.** Prediction results of the years 2021 and 2022

| Uni<br>t | Year 2021    |               |                |               | 2022         |               |                |               |
|----------|--------------|---------------|----------------|---------------|--------------|---------------|----------------|---------------|
|          | Quarter<br>I | Quarter<br>II | Quarter<br>III | Quarter<br>IV | Quarter<br>I | Quarter<br>II | Quarter<br>III | Quarter<br>IV |
| 1        | 583665       | 596259        | 609272         | 622705        | 636558       | 650830        | 665523         | 680635        |
| 2        | 311042       | 316209        | 321508         | 326939        | 332500       | 338194        | 344018         | 349974        |
| 3        | 807975       | 818150        | 828447         | 838867        | 849408       | 860072        | 870857         | 881765        |
| 4        | 46700        | 46770         | 46790          | 46760         | 46681        | 46551         | 46372          | 46144         |
| 5        | 2936         | 2982          | 3029           | 3076          | 3125         | 3174          | 3225           | 3276          |
| 6        | 437772       | 443560        | 449341         | 455117        | 460886       | 466650        | 472407         | 478158        |
| 7        | 547683       | 555563        | 563512         | 571531        | 579619       | 587777        | 596003         | 604300        |
| 8        | 181256       | 178398        | 175176         | 171590        | 167641       | 163328        | 158652         | 153611        |
| 9        | 103867       | 103569        | 103177         | 102689        | 102106       | 101429        | 100656         | 99788         |
| 10       | 184172       | 188925        | 193770         | 198706        | 203735       | 208855        | 214067         | 219370        |
| 11       | 181860       | 184426        | 186968         | 189485        | 191978       | 194448        | 196893         | 199314        |
| 12       | 115865       | 117094        | 118299         | 119479        | 120636       | 121769        | 122878         | 123964        |
| 13       | 74808        | 75452         | 76047          | 76594         | 77093        | 77544         | 77946          | 78300         |
| 14       | 146057       | 147128        | 148161         | 149156        | 150113       | 151031        | 151910         | 152752        |
| 15       | 139022       | 140988        | 142957         | 144929        | 146902       | 148878        | 150856         | 152836        |
| 16       | 52621        | 54170         | 55767          | 57412         | 59106        | 60848         | 62639          | 64478         |
| 17       | 77687        | 78630         | 79539          | 80414         | 81257        | 82066         | 82841          | 83583         |

Here is a mixed result of actual values and predictive data obtained from the SVR process mapped in **Table 9**.

**Table 9.** Quarter IV prediction data 2021 and the whole of 2022

| Uni<br>t | Year 2021    |               |                |               | 2022         |               |                |               |
|----------|--------------|---------------|----------------|---------------|--------------|---------------|----------------|---------------|
|          | Quarter<br>I | Quarter<br>II | Quarter<br>III | Quarter<br>IV | Quarter<br>I | Quarter<br>II | Quarter<br>III | Quarter<br>IV |
| 1        | 524832       | 596259        | 618569         | 622705        | 636558       | 650830        | 665523         | 680635        |
| 2        | 303403       | 337953        | 413148         | 326939        | 332500       | 338194        | 344018         | 349974        |
| 3        | 787424       | 805622        | 828448         | 838867        | 849408       | 860072        | 870857         | 881765        |
| 4        | 46701        | 46035         | 47532          | 46760         | 46681        | 46551         | 46372          | 46144         |
| 5        | 2936         | 2986          | 3001           | 3076          | 3125         | 3174          | 3225           | 3276          |
| 6        | 428662       | 422463        | 449342         | 455117        | 460886       | 466650        | 472407         | 478158        |
| 7        | 519885       | 546386        | 563513         | 571531        | 579619       | 587777        | 596003         | 604300        |

|    |        |        |        |        |        |        |        |        |
|----|--------|--------|--------|--------|--------|--------|--------|--------|
| 8  | 169661 | 175953 | 168854 | 171590 | 167641 | 163328 | 158652 | 153611 |
| 9  | 101513 | 103570 | 97656  | 102689 | 102106 | 101429 | 100656 | 99788  |
| 10 | 181819 | 185264 | 188894 | 198706 | 203735 | 208855 | 214067 | 219370 |
| 11 | 181861 | 184423 | 184410 | 189485 | 191978 | 194448 | 196893 | 199314 |
| 12 | 114310 | 116310 | 118299 | 119479 | 120636 | 121769 | 122878 | 123964 |
| 13 | 74750  | 75452  | 73690  | 76594  | 77093  | 77544  | 77946  | 78300  |
| 14 | 137524 | 157132 | 127335 | 149156 | 150113 | 151031 | 151910 | 152752 |
| 15 | 128821 | 140989 | 132752 | 144929 | 146902 | 148878 | 150856 | 152836 |
| 16 | 49558  | 52171  | 60846  | 57412  | 59106  | 60848  | 62639  | 64478  |
| 17 | 76927  | 77396  | 76494  | 80414  | 81257  | 82066  | 82841  | 83583  |

In **Table 9** the prediction result data is displayed in gray. It can be seen that the average value tends to increase. Next, it is continued by calculating the accuracy value using the MAPE method.

### 3.4 Accuracy, Error MAPE Testing

In the MAPE test, the calculation of the percentage of errors in the prediction results will be carried out. The way to get MAPE results can be seen in equation (3) by comparing the prediction results that can be seen in all **Of Table 5** to **Table 8** Quarter III 2021 with actual data that can be seen in all **of Table 1** to **Table 4** of Quarter III 2021. The following will be mapped in **Table 10** through **Table 15** :

**Table 10.** Accuracy maape unit 1, unit 2, unit 3

| Quarter | Unit 1 |         |      | Unit 2 |         |      | Unit 3 |         |      |
|---------|--------|---------|------|--------|---------|------|--------|---------|------|
|         | Actual | Predict | MAPE | Actual | Predict | MAPE | Actual | Predict | MAPE |
| 1       | 373325 | 407390  | 9,1  | 227523 | 226454  | 0,5  | 579828 | 600392  | 3,5  |
| 2       | 409907 | 409907  | 0,0  | 228468 | 228467  | 0,0  | 602876 | 607637  | 0,8  |
| 3       | 433272 | 412843  | 4,7  | 217356 | 230612  | 6,1  | 615005 | 615005  | 0,0  |
| 4       | 338703 | 416199  | 22,9 | 208347 | 232888  | 11,8 | 621183 | 622494  | 0,2  |
| 5       | 395458 | 419975  | 6,2  | 203805 | 235295  | 15,5 | 617397 | 630106  | 2,1  |
| 6       | 442484 | 424170  | 4,1  | 210169 | 237834  | 13,2 | 635488 | 637840  | 0,4  |
| 7       | 462893 | 428786  | 7,4  | 221849 | 240504  | 8,4  | 644069 | 645696  | 0,3  |
| 8       | 370763 | 433821  | 17,0 | 255046 | 243305  | 4,6  | 648249 | 653673  | 0,8  |
| 9       | 438520 | 439277  | 0,2  | 255965 | 246238  | 3,8  | 661774 | 661773  | 0,0  |
| 10      | 468865 | 445152  | 5,1  | 246535 | 249303  | 1,1  | 682513 | 669995  | 1,8  |
| 11      | 489399 | 451447  | 7,8  | 250497 | 252499  | 0,8  | 698586 | 678340  | 2,9  |

|                      |        |        |      |        |        |      |        |        |     |
|----------------------|--------|--------|------|--------|--------|------|--------|--------|-----|
| 12                   | 391180 | 458162 | 17,1 | 276557 | 255826 | 7,5  | 696839 | 686806 | 1,4 |
| 13                   | 465397 | 465297 | 0,0  | 284732 | 259285 | 8,9  | 710352 | 695394 | 2,1 |
| 14                   | 502398 | 472852 | 5,9  | 293755 | 262875 | 10,5 | 729874 | 704104 | 3,5 |
| 15                   | 519473 | 480826 | 7,4  | 315501 | 266596 | 15,5 | 754221 | 712937 | 5,5 |
| 16                   | 413354 | 489221 | 18,4 | 304999 | 270450 | 11,3 | 753004 | 721891 | 4,1 |
| 17                   | 478506 | 498035 | 4,1  | 294001 | 274434 | 6,7  | 759018 | 730968 | 3,7 |
| 18                   | 537752 | 507269 | 5,7  | 292756 | 278550 | 4,9  | 773712 | 740166 | 4,3 |
| 19                   | 546817 | 516923 | 5,5  | 282798 | 282797 | 0,0  | 798054 | 749487 | 6,1 |
| 20                   | 449668 | 526997 | 17,2 | 280359 | 287176 | 2,4  | 788811 | 758930 | 3,8 |
| 21                   | 503503 | 537491 | 6,8  | 267420 | 291686 | 9,1  | 783622 | 768495 | 1,9 |
| 22                   | 569757 | 548405 | 3,7  | 231508 | 296328 | 28,0 | 732565 | 778182 | 6,2 |
| 23                   | 571588 | 559739 | 2,1  | 239875 | 301101 | 25,5 | 773434 | 787991 | 1,9 |
| 24                   | 470238 | 571492 | 21,5 | 254739 | 306006 | 20,1 | 778422 | 797922 | 2,5 |
| 25                   | 524832 | 583665 | 11,2 | 303403 | 311042 | 2,5  | 787424 | 807975 | 2,6 |
| 26                   | 596259 | 596259 | 0,0  | 337953 | 316209 | 6,4  | 805622 | 818150 | 1,6 |
| 27                   | 618569 | 609272 | 1,5  | 413148 | 321508 | 22,2 | 828448 | 828447 | 0,0 |
| Average of Each Unit |        |        | 7,9  |        |        |      | 9,2    | 2,4    |     |
| Overall Average      |        |        | 3,6  |        |        |      |        |        |     |

Table 11. Accuracy MAPE unit 4, unit 5, unit 6

| Quarter | Unit 4 |         |      | Unit 5 |         |      | Unit 6 |         |      |
|---------|--------|---------|------|--------|---------|------|--------|---------|------|
|         | Actual | Predict | MAPE | Actual | Predict | MAPE | Actual | Predict | MAPE |
| 1       | 29429  | 30116   | 2,3  | 2058   | 2077    | 0,9  | 273054 | 297016  | 8,8  |
| 2       | 32892  | 31379   | 4,6  | 2141   | 2103    | 1,8  | 282761 | 302952  | 7,1  |
| 3       | 32592  | 32592   | 0,0  | 2156   | 2130    | 1,2  | 299389 | 308881  | 3,2  |
| 4       | 34922  | 33755   | 3,3  | 2191   | 2158    | 1,5  | 321881 | 314805  | 2,2  |
| 5       | 32148  | 34868   | 8,5  | 2177   | 2187    | 0,5  | 306119 | 320722  | 4,8  |
| 6       | 34882  | 35932   | 3,0  | 2217   | 2216    | 0,0  | 311274 | 326633  | 4,9  |
| 7       | 36699  | 36946   | 0,7  | 2237   | 2247    | 0,4  | 327034 | 332538  | 1,7  |
| 8       | 38615  | 37911   | 1,8  | 2279   | 2278    | 0,0  | 343175 | 338436  | 1,4  |
| 9       | 38826  | 38826   | 0,0  | 2303   | 2310    | 0,3  | 329889 | 344329  | 4,4  |
| 10      | 39254  | 39691   | 1,1  | 2334   | 2343    | 0,4  | 340378 | 350215  | 2,9  |
| 11      | 41769  | 40506   | 3,0  | 2376   | 2377    | 0,0  | 358918 | 356095  | 0,8  |
| 12      | 42491  | 41271   | 2,9  | 2425   | 2411    | 0,6  | 381328 | 361970  | 5,1  |
| 13      | 41935  | 41987   | 0,1  | 2406   | 2447    | 1,7  | 367838 | 367837  | 0,0  |
| 14      | 43573  | 42654   | 2,1  | 2452   | 2483    | 1,3  | 374679 | 373699  | 0,3  |

|                             |       |       |      |      |      |     |        |        |     |
|-----------------------------|-------|-------|------|------|------|-----|--------|--------|-----|
| 15                          | 45242 | 43270 | 4,4  | 2536 | 2520 | 0,6 | 397582 | 379555 | 4,5 |
| 16                          | 45890 | 43837 | 4,5  | 2630 | 2558 | 2,7 | 422199 | 385404 | 8,7 |
| 17                          | 44179 | 44354 | 0,4  | 2627 | 2596 | 1,2 | 406888 | 391247 | 3,8 |
| 18                          | 44742 | 44821 | 0,2  | 2664 | 2636 | 1,1 | 410946 | 397084 | 3,4 |
| 19                          | 47286 | 45239 | 4,3  | 2665 | 2676 | 0,4 | 431255 | 402915 | 6,6 |
| 20                          | 48909 | 45607 | 6,8  | 2781 | 2717 | 2,3 | 452652 | 408740 | 9,7 |
| 21                          | 45934 | 45925 | 0,0  | 2760 | 2759 | 0,0 | 419714 | 414559 | 1,2 |
| 22                          | 41995 | 46193 | 10,0 | 2778 | 2802 | 0,9 | 389446 | 420371 | 7,9 |
| 23                          | 45701 | 46412 | 1,6  | 2837 | 2846 | 0,3 | 412959 | 426178 | 3,2 |
| 24                          | 46112 | 46581 | 1,0  | 2929 | 2890 | 1,3 | 430540 | 431978 | 0,3 |
| 25                          | 46701 | 46700 | 0,0  | 2936 | 2936 | 0,0 | 428662 | 437772 | 2,1 |
| 26                          | 46035 | 46770 | 1,6  | 2986 | 2982 | 0,1 | 422463 | 443560 | 5,0 |
| 27                          | 47532 | 46790 | 1,6  | 3001 | 3029 | 0,9 | 449342 | 449341 | 0,0 |
| <b>Average of Each Unit</b> |       |       | 2,6  |      |      | 0,8 |        |        | 3,9 |
| <b>Overall Average</b>      |       |       |      |      |      |     |        |        |     |

**Table 12.** Accuracy MAPE unit 7, unit 8, unit 9

| Quarter | Unit 7 |         |      | Unit 8 |         |      | Unit 9 |         |      |
|---------|--------|---------|------|--------|---------|------|--------|---------|------|
|         | Actual | Predict | MAPE | Actual | Predict | MAPE | Actual | Predict | MAPE |
| 1       | 363094 | 379389  | 4,5  | 132577 | 140741  | 6,2  | 82644  | 82501   | 0,2  |
| 2       | 381908 | 385603  | 1,0  | 139950 | 146611  | 4,8  | 84557  | 84484   | 0,1  |
| 3       | 394050 | 391887  | 0,5  | 152119 | 152118  | 0,0  | 86189  | 86372   | 0,2  |
| 4       | 393826 | 398239  | 1,1  | 153818 | 157262  | 2,2  | 88166  | 88165   | 0,0  |
| 5       | 393073 | 404662  | 2,9  | 149872 | 162041  | 8,1  | 88503  | 89863   | 1,5  |
| 6       | 408834 | 411153  | 0,6  | 152632 | 166457  | 9,1  | 89809  | 91466   | 1,8  |
| 7       | 416503 | 417715  | 0,3  | 170510 | 170509  | 0,0  | 91428  | 92974   | 1,7  |
| 8       | 417000 | 424345  | 1,8  | 171980 | 174198  | 1,3  | 93316  | 94387   | 1,1  |
| 9       | 425402 | 431045  | 1,3  | 167955 | 177523  | 5,7  | 94424  | 95705   | 1,4  |
| 10      | 437815 | 437814  | 0,0  | 177806 | 180484  | 1,5  | 95954  | 96928   | 1,0  |
| 11      | 453517 | 444653  | 2,0  | 195536 | 183081  | 6,4  | 97546  | 98056   | 0,5  |
| 12      | 452130 | 451561  | 0,1  | 193933 | 185315  | 4,4  | 99089  | 99088   | 0,0  |
| 13      | 460221 | 458539  | 0,4  | 189188 | 187185  | 1,1  | 100182 | 100026  | 0,2  |
| 14      | 477819 | 465586  | 2,6  | 200807 | 188691  | 6,0  | 102215 | 100869  | 1,3  |
| 15      | 499868 | 472702  | 5,4  | 202530 | 189834  | 6,3  | 104250 | 101617  | 2,5  |
| 16      | 493905 | 479888  | 2,8  | 205253 | 190613  | 7,1  | 106063 | 102269  | 3,6  |
| 17      | 498968 | 487143  | 2,4  | 209334 | 191028  | 8,7  | 106919 | 102827  | 3,8  |

|                      |        |        |      |        |        |      |        |        |      |
|----------------------|--------|--------|------|--------|--------|------|--------|--------|------|
| 18                   | 513180 | 494468 | 3,6  | 220898 | 191079 | 13,5 | 108790 | 103289 | 5,1  |
| 19                   | 527752 | 501862 | 4,9  | 225141 | 190767 | 15,3 | 110804 | 103657 | 6,5  |
| 20                   | 520479 | 509325 | 2,1  | 226175 | 190091 | 16,0 | 113699 | 103930 | 8,6  |
| 21                   | 517642 | 516858 | 0,2  | 202881 | 189051 | 6,8  | 109742 | 104107 | 5,1  |
| 22                   | 473246 | 524460 | 10,8 | 131884 | 187648 | 42,3 | 84184  | 104190 | 23,8 |
| 23                   | 499555 | 532132 | 6,5  | 171185 | 185881 | 8,6  | 97103  | 104177 | 7,3  |
| 24                   | 505027 | 539873 | 6,9  | 183751 | 183750 | 0,0  | 103201 | 104070 | 0,8  |
| 25                   | 519885 | 547683 | 5,3  | 169661 | 181256 | 6,8  | 101513 | 103867 | 2,3  |
| 26                   | 546386 | 555563 | 1,7  | 175953 | 178398 | 1,4  | 103570 | 103569 | 0,0  |
| 27                   | 563513 | 563512 | 0,0  | 168854 | 175176 | 3,7  | 97656  | 103177 | 5,7  |
| Average of Each Unit |        |        | 2,7  |        |        |      | 7,2    |        |      |
| Overall Average      |        |        |      |        |        |      |        |        |      |

Table 13. MAPE accuracy unit 10, unit 11, unit 12

| Quarter | Unit 10 |         |      | Unit 11 |         |      | Unit 12 |         |      |
|---------|---------|---------|------|---------|---------|------|---------|---------|------|
|         | Actual  | Predict | MAPE | Actual  | Predict | MAPE | Actual  | Predict | MAPE |
| 1       | 97645   | 97644   | 0,0  | 110846  | 113065  | 2,0  | 79797   | 79198   | 0,8  |
| 2       | 100100  | 100194  | 0,1  | 110051  | 116208  | 5,6  | 81270   | 81001   | 0,3  |
| 3       | 103339  | 102835  | 0,5  | 119328  | 119327  | 0,0  | 82682   | 82780   | 0,1  |
| 4       | 104933  | 105569  | 0,6  | 124175  | 122423  | 1,4  | 83853   | 84535   | 0,8  |
| 5       | 106343  | 108394  | 1,9  | 124958  | 125494  | 0,4  | 86267   | 86266   | 0,0  |
| 6       | 110708  | 111311  | 0,5  | 128137  | 128541  | 0,3  | 87175   | 87974   | 0,9  |
| 7       | 114719  | 114319  | 0,3  | 133302  | 131564  | 1,3  | 88195   | 89657   | 1,7  |
| 8       | 117420  | 117420  | 0,0  | 133810  | 134562  | 0,6  | 88852   | 91316   | 2,8  |
| 9       | 123693  | 120612  | 2,5  | 138290  | 137537  | 0,5  | 92776   | 92952   | 0,2  |
| 10      | 129104  | 123896  | 4,0  | 141673  | 140488  | 0,8  | 95482   | 94563   | 1,0  |
| 11      | 130302  | 127272  | 2,3  | 147135  | 143415  | 2,5  | 96539   | 96151   | 0,4  |
| 12      | 130617  | 130739  | 0,1  | 144105  | 146317  | 1,5  | 97462   | 97715   | 0,3  |
| 13      | 133303  | 134299  | 0,7  | 149196  | 149196  | 0,0  | 99255   | 99254   | 0,0  |
| 14      | 135897  | 137950  | 1,5  | 151306  | 152050  | 0,5  | 100594  | 100770  | 0,2  |
| 15      | 144298  | 141693  | 1,8  | 157498  | 154880  | 1,7  | 102189  | 102262  | 0,1  |
| 16      | 145440  | 145528  | 0,1  | 158316  | 157687  | 0,4  | 103976  | 103730  | 0,2  |
| 17      | 149414  | 149455  | 0,0  | 164203  | 160469  | 2,3  | 107547  | 105174  | 2,2  |
| 18      | 154112  | 153473  | 0,4  | 162502  | 163227  | 0,4  | 108953  | 106594  | 2,2  |
| 19      | 160842  | 157583  | 2,0  | 170213  | 165961  | 2,5  | 110858  | 107990  | 2,6  |
| 20      | 162164  | 161785  | 0,2  | 174516  | 168671  | 3,3  | 112098  | 109363  | 2,4  |

|                             |        |        |     |        |        |     |        |        |     |
|-----------------------------|--------|--------|-----|--------|--------|-----|--------|--------|-----|
| 21                          | 166869 | 166079 | 0,5 | 184403 | 171357 | 7,1 | 112980 | 110711 | 2,0 |
| 22                          | 171870 | 170465 | 0,8 | 163902 | 174019 | 6,2 | 112854 | 112035 | 0,7 |
| 23                          | 177588 | 174942 | 1,5 | 168371 | 176657 | 4,9 | 113934 | 113336 | 0,5 |
| 24                          | 179512 | 179511 | 0,0 | 179390 | 179271 | 0,1 | 114013 | 114612 | 0,5 |
| 25                          | 181819 | 184172 | 1,3 | 181861 | 181860 | 0,0 | 114310 | 115865 | 1,4 |
| 26                          | 185264 | 188925 | 2,0 | 184423 | 184426 | 0,0 | 116310 | 117094 | 0,7 |
| 27                          | 188894 | 193770 | 2,6 | 184410 | 186968 | 1,4 | 118299 | 118299 | 0,0 |
| <b>Average of Each Unit</b> |        |        | 1,1 |        |        | 1,8 |        |        | 0,9 |
| <b>Overall Average</b>      |        |        |     |        |        |     |        |        |     |

**Table 14.** MAPE accuracy unit 13, unit 14, unit 15

| Quarter | Unit 13 |         |      | Unit 14 |         |      | Unit 15 |         |      |
|---------|---------|---------|------|---------|---------|------|---------|---------|------|
|         | Actual  | Predict | MAPE | Actual  | Predict | MAPE | Actual  | Predict | MAPE |
| 1       | 45469   | 44878   | 1,3  | 99646   | 108848  | 9,2  | 84344   | 92477   | 9,6  |
| 2       | 46681   | 44878   | 3,9  | 108687  | 110839  | 2,0  | 94391   | 94391   | 0,0  |
| 3       | 48496   | 48434   | 0,1  | 118103  | 112792  | 4,5  | 100735  | 96307   | 4,4  |
| 4       | 49622   | 50140   | 1,0  | 122947  | 114706  | 6,7  | 108142  | 98225   | 9,2  |
| 5       | 51360   | 51797   | 0,9  | 111395  | 116582  | 4,7  | 94403   | 100146  | 6,1  |
| 6       | 52007   | 53406   | 2,7  | 120262  | 118420  | 1,5  | 105388  | 102069  | 3,1  |
| 7       | 53494   | 54967   | 2,8  | 120220  | 120220  | 0,0  | 103632  | 103994  | 0,3  |
| 8       | 54763   | 56480   | 3,1  | 124614  | 121981  | 2,1  | 113922  | 105921  | 7,0  |
| 9       | 56867   | 57944   | 1,9  | 113449  | 123704  | 9,0  | 100944  | 107851  | 6,8  |
| 10      | 58705   | 59360   | 1,1  | 121547  | 125388  | 3,2  | 108618  | 109783  | 1,1  |
| 11      | 60728   | 60728   | 0,0  | 125627  | 127034  | 1,1  | 111717  | 111716  | 0,0  |
| 12      | 61917   | 62047   | 0,2  | 138720  | 128642  | 7,3  | 125859  | 113652  | 9,7  |
| 13      | 63452   | 63318   | 0,2  | 123782  | 130212  | 5,2  | 109541  | 115591  | 5,5  |
| 14      | 66004   | 64541   | 2,2  | 133546  | 131743  | 1,4  | 117453  | 117531  | 0,1  |
| 15      | 68037   | 65716   | 3,4  | 134568  | 133236  | 1,0  | 120454  | 119474  | 0,8  |
| 16      | 69602   | 66842   | 4,0  | 149790  | 134691  | 10,1 | 134300  | 121419  | 9,6  |
| 17      | 72078   | 67920   | 5,8  | 133855  | 136107  | 1,7  | 118549  | 123366  | 4,1  |
| 18      | 75061   | 68950   | 8,1  | 147290  | 137485  | 6,7  | 127592  | 125315  | 1,8  |
| 19      | 77759   | 69932   | 10,1 | 139234  | 138824  | 0,3  | 133260  | 127267  | 4,5  |
| 20      | 79387   | 70865   | 10,7 | 151244  | 140126  | 7,4  | 142975  | 129220  | 9,6  |
| 21      | 78466   | 71750   | 8,6  | 141389  | 141389  | 0,0  | 129855  | 131176  | 1,0  |
| 22      | 67629   | 72587   | 7,3  | 140111  | 142613  | 1,8  | 130378  | 133134  | 2,1  |
| 23      | 72978   | 73376   | 0,5  | 143629  | 143800  | 0,1  | 139195  | 135094  | 2,9  |

|                             |       |       |     |        |        |      |        |        |     |
|-----------------------------|-------|-------|-----|--------|--------|------|--------|--------|-----|
| 24                          | 75183 | 74116 | 1,4 | 155047 | 144948 | 6,5  | 149969 | 137057 | 8,6 |
| 25                          | 74750 | 74808 | 0,1 | 137524 | 146057 | 6,2  | 128821 | 139022 | 7,9 |
| 26                          | 75452 | 75452 | 0,0 | 157132 | 147128 | 6,4  | 140989 | 140988 | 0,0 |
| 27                          | 73690 | 76047 | 3,2 | 127335 | 148161 | 16,4 | 132752 | 142957 | 7,7 |
| <b>Average of Each Unit</b> |       |       | 3,1 |        |        | 4,5  |        |        | 4,6 |
| <b>Overall Average</b>      |       |       |     |        |        |      |        |        |     |

**Table 15.** Accuracy mape unit 16, unit 17

| Quarter | Unit 16 |         |      | Unit 17 |         |      |
|---------|---------|---------|------|---------|---------|------|
|         | Actual  | Predict | MAPE | Actual  | Predict | MAPE |
| 1       | 28368   | 29970   | 5,6  | 45476   | 45044   | 0,9  |
| 2       | 30116   | 30358   | 0,8  | 46789   | 46788   | 0,0  |
| 3       | 31283   | 30793   | 1,6  | 48546   | 48499   | 0,1  |
| 4       | 33424   | 31277   | 6,4  | 49770   | 50177   | 0,8  |
| 5       | 31541   | 31810   | 0,9  | 50925   | 51821   | 1,8  |
| 6       | 32644   | 32391   | 0,8  | 51969   | 53431   | 2,8  |
| 7       | 32849   | 33020   | 0,5  | 53564   | 55009   | 2,7  |
| 8       | 35067   | 33698   | 3,9  | 54970   | 56553   | 2,9  |
| 9       | 34424   | 34424   | 0,0  | 57121   | 58063   | 1,6  |
| 10      | 35415   | 35198   | 0,6  | 58926   | 59540   | 1,0  |
| 11      | 36443   | 36021   | 1,2  | 60984   | 60984   | 0,0  |
| 12      | 38550   | 36892   | 4,3  | 62228   | 62394   | 0,3  |
| 13      | 37479   | 37812   | 0,9  | 63837   | 63771   | 0,1  |
| 14      | 38780   | 38780   | 0,0  | 66306   | 65114   | 1,8  |
| 15      | 39612   | 39796   | 0,5  | 68472   | 66424   | 3,0  |
| 16      | 42199   | 40861   | 3,2  | 69961   | 67701   | 3,2  |
| 17      | 41439   | 41974   | 1,3  | 72363   | 68944   | 4,7  |
| 18      | 43055   | 43135   | 0,2  | 76176   | 70154   | 7,9  |
| 19      | 44130   | 44345   | 0,5  | 79395   | 71330   | 10,2 |
| 20      | 46116   | 45604   | 1,1  | 81069   | 72473   | 10,6 |
| 21      | 46911   | 46910   | 0,0  | 80516   | 73583   | 8,6  |
| 22      | 45346   | 48266   | 6,4  | 68742   | 74659   | 8,6  |
| 23      | 52813   | 49669   | 6,0  | 75702   | 75702   | 0,0  |
| 24      | 56079   | 51121   | 8,8  | 77609   | 76711   | 1,2  |
| 25      | 49558   | 52621   | 6,2  | 76927   | 77687   | 1,0  |
| 26      | 52171   | 54170   | 3,8  | 77396   | 78630   | 1,6  |
| 27      | 60846   | 55767   | 8,3  | 76494   | 79539   | 4,0  |

|                      |     |     |
|----------------------|-----|-----|
| Average of Each Unit | 2,7 | 3,0 |
| Overall Average      |     |     |

From the results of the MAPE accuracy test which can be seen in **Table 10** to **Table 15**, various results were obtained in each unit. The units are described and can be viewed in **3.2 Data** Collection. The overall MAPE average accuracy of 3.6% can be seen in **Table 10**, where the accuracy of the data is included in the category of excellent.

### 3.5 Result Analysis

The analysis that will be carried out is to analyze the percentage increase in the economic level along with the decrease in the PPKM level. PPKM level 4 in Indonesia started in July 2021, where that month was categorized in the 3rd Quarter. It can be seen in the following table:

**Table 16.** Analysis of the percentage increase in economic value

| Sektoc | Percentage Increase in Economic Rate |           |            |           |          |
|--------|--------------------------------------|-----------|------------|-----------|----------|
|        | Growth I                             | Growth II | Growth III | Growth IV | Growth V |
| 1      | 0,67                                 | 2,22      | 2,24       | 2,26      | 2,27     |
| 2      | -20,87                               | 1,70      | 1,71       | 1,72      | 1,73     |
| 3      | 1,26                                 | 1,26      | 1,26       | 1,25      | 1,25     |
| 4      | -1,62                                | -0,17     | -0,28      | -0,38     | -0,49    |
| 5      | 2,50                                 | 1,59      | 1,57       | 1,61      | 1,58     |
| 6      | 1,29                                 | 1,27      | 1,25       | 1,23      | 1,22     |
| 7      | 1,42                                 | 1,42      | 1,41       | 1,40      | 1,39     |
| 8      | 1,62                                 | -2,30     | -2,57      | -2,86     | -3,18    |
| 9      | 5,15                                 | -0,57     | -0,66      | -0,76     | -0,86    |
| 10     | 5,19                                 | 2,53      | 2,51       | 2,50      | 2,48     |
| 11     | 2,75                                 | 1,32      | 1,29       | 1,26      | 1,23     |
| 12     | 1,00                                 | 0,97      | 0,94       | 0,91      | 0,88     |
| 13     | 3,94                                 | 0,65      | 0,59       | 0,52      | 0,45     |
| 14     | 17,14                                | 0,64      | 0,61       | 0,58      | 0,55     |
| 15     | 9,17                                 | 1,36      | 1,35       | 1,33      | 1,31     |
| 16     | -5,64                                | 2,95      | 2,95       | 2,94      | 2,94     |
| 17     | 5,12                                 | 1,05      | 1,00       | 0,94      | 0,90     |

From the data that has been processed and mapped in **Table 16**, the results of the percentage increase and decrease in the economic level are obtained. The

increase I is the result of an increase or decrease from Quarter III 2021 to Quarter IV 2021. The increase II is the result of an increase or decrease from Quarter IV 2021 to Quarter I 2022. The increase III is the result of an increase or decrease from Quarter I 2022 to Quarter II 2022. The iv increase is the result of an increase or decrease from Quarter II 2022 to Quarter III 2022. The increase in V is the result of an increase or decrease from Quarter III 2022 to Quarter IV 2022.

It can be seen from the data that the increase and decrease of each Quarter is quite diverse. However, it can be concluded that the dominant of each unit has increased in each Quarter. The average of all units and Quarters obtained a yield of 1.14% where this result showed an increase in the economic level along with a decrease in the PPKM level.

#### 4 CONCLUSION

Based on research and analysis that has been carried out to predict the level of economic growth with the effect of decreasing the PPKM level, several conclusions were obtained, namely with a decrease in the PPKM level, the percentage value of the average economic rate increase of 1.14% will be obtained until the end of 2022. From this study, the estimated value of economic value for Quarter IV of 2021 and the entire year 2022 was also obtained from the 17 units that have been determined. The data obtained has an error accuracy value with the MAPE method of 3.6% where this result is included in the excellent category.

With this research, it is hoped that it can provide benefits for the community and the government. It is hoped that the first can provide an overview of the future how the economic situation will prevail, secondly, provide a little sense of calm when knowing that the decreasing PPKM level will provide periodic progress towards normal and better, and the third can provide an overview of how economic strategies to be used in the future to have a more optimal impact.

#### REFERENCES

- [1] I. M. Jaafar and A. Sahari, "Prediksi Tingkat Pertumbuhan Ekonomi Provinsi Sulawesi," JIMT (Jurnal Ilm. Mat. dan Ter., vol. 16, pp. 126–134, 2019.
- [2] N. Hendajany and R. Wati, "Prediksi indikator makro ekonomi Indonesia dengan model vector autoregressive periode 2019-2023," J. Ekon. dan Bisnis, vol. 23, no. 2, pp. 189–202, 2020, doi: 10.24914/jeb.v23i1.2878.
- [3] D. Y. Dalimunthe, "Analisis Peramalan Data Produk Domestik Regional Bruto ( PDRB ) sebagai Tolak Ukur Kinerja Perekonomian Provinsi Kepulauan Bangka Belitung," Integr. J. Bus. Econ., vol. 1, no. 1, pp. 19–27,

- 2017.
- [4] N. P. N. Hendayanti, I. K. P. Suniantara, and M. Nurhidayati, "Penerapan Support Vector Regression (Svr) Dalam Memprediksi Jumlah Kunjungan Wisatawan Domestik Ke Bali," J. Varian, vol. 3, no. 1, pp. 43–50, 2019, doi: 10.30812/varian.v3i1.506.
  - [5] H. A. Parhusip, "Study on COVID-19 in the World and Indonesia Using Regression Model of SVM, Bayesian Ridge and Gaussian," J. Ilm. Sains, vol. 20, no. 2, p. 49, 2020, doi: 10.35799/jis.20.2.2020.28256.
  - [6] M. P. Raharyani, R. R. M. Putri, and B. D. Setiawan, "Implementasi Algoritme Support Vector Regression Pada Prediksi Jumlah Pengunjung Pariwisata," J. Teknol. Inf. dan Ilmu Komput., vol. 2, no. 4, pp. 1501–1509, 2018.
  - [7] D. I. Purnama et al., "TRANSPORTASI UDARA DI SULAWESI TENGAH MENGGUNAKAN SUPPORT VECTOR REGRESSION (SVR)," vol. 17, pp. 109–117, 2020.
  - [8] N. N. Wijayaningrum, Vivi Nur Putriwijaya, "Support Vector Regression Untuk Memprediksi Jumlah Kunjungan Wisatawan Mancanegara di Pulau Bali," Mach. Learn. Methods Appl. to Brain Disord., vol. 11, pp. 123–140, 2019.
  - [9] Amanda Risky, Hasbi Yasin, and Alan Prahutama, "ANALISIS SUPPORT VECTOR REGRESSION (SVR) DALAM MEMPREDIKSI KURS RUPIAH TERHADAP DOLLAR AMERIKA SERIKAT", vol. 07, no. 1, pp. 53–60, 2019.
  - [10] R. E. Cahyono, J. P. Sugiono, and S. Tjandra, "Analisis Kinerja Metode Support Vector Regression (SVR) dalam Memprediksi Indeks Harga Konsumen," JTIM J. Teknol. Inf. dan Multimed., vol. 1, no. 2, pp. 106–116, 2019, doi: 10.35746/jtim.v1i2.22
  - [11] H. C. S. Ningrum, "Perbandingan Metode Support Vector Machine (SVM) Linear, Radial Basis Function (RBF), dan Polinomial Kernel dalam Klasifikasi Bidang Studi Lanjut Pilihan Alumni UII," Stat. UII, 2018.
  - [12] Muzakir, Ari, & Usman Ependi. "Model for Identification and Prediction of Leaf Patterns: Preliminary Study for Improvement." Scientific Journal of Informatics [Online], 8.2 (2021): 244-250. Web. 8 May. 2022
  - [13] "Badan Pusat Statistik." <https://www.bps.go.id/> (accessed Nov. 17, 2021).