13 (2) (2024) 390 - 396
Journal of Physical Education, Sport, Health and Recreations
https://journal.unnes.ac.id/journals/peshr

The Relationship Between Arm Length and Arm Muscle Power with the Chest Pass Ability

Pajar Juanda[1]✉, Iyakrus[2], Ahmad Richard Victorian[3]

Program Study of Physical Education and Health Sciences, Faculty of Teacher Training and Education, Sriwijaya University, Palembang, Indonesia[123]

Article History

Received May 2024
Accepted June 2024
Published Vol.13 No.(2) 2024

Keywords:
Arm Length; Arm Muscle Power; Chest Pass

Abstract

The aim of this study is to determine whether there is a relationship between arm length, arm muscle power, and chest pass ability among male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School. This research is designed using a correlational research design. It is a population study involving all male students participating in the basketball extracurricular program at Muara Pinang 1 Public Senior High School, totaling 30 individuals. Data collection techniques include testing, and data analysis is performed using correlation tests. The results of data processing and analysis indicate a strong correlation between arm length and chest pass ability (r = 0.87), as well as between arm muscle power and chest pass ability (r = 0.87). The findings suggest a highly significant relationship between arm length, arm muscle power, and chest pass ability among male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School, with a correlation coefficient of 0.93.

How to Cite

Juanda, P., Iyakrus., & Victorian, A. R. (2024). The Relationship Between Arm Length and Arm Muscle Power with the Chest Pass Ability. Journal of Physical Education, Sport, Health and Recreation, 13 (2), 390-396.

✉ Correspondence address :
E-mail: : pajarjuanda@gmail.com

p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Physical education and health taught in schools represent the implementation of educational sports, which is a key component of the education curriculum in Indonesia. This physical education and health program serves as a tool or medium to enhance physical growth, intellectual development, and motor skills that are specific to formal education. Physical education is a means to achieve educational objectives, or a form of education through the adaptation of physical activities like body organs, neuromuscular functions, intellectual growth, socialization, cultural understanding, emotions, and ethics (Iyakrus, 2018).

In physical education classes at schools, almost all sports disciplines are taught, including basketball. Basketball is one of the large-ball sports, played by two teams, each consisting of five players, with the goal of scoring as many points as possible by shooting the ball into the opponent's basket. The game is popular among teenagers and adults alike. According to Victorian & Sari, (2019) basketball is a very complex sport, its movements consist of several neat movement elements, so it can be played well. According to Jati, (2019) basketball is a popular sport in Indonesia. The game of basketball is a team sport consisting of five players with the aim of putting the ball into the opponent's basket to score points and preventing the opponent from scoring points.There are several fundamental techniques in basketball, such as dribbling, passing, and shooting. According to Harliawan, M., Imran Hasanuddin, (2023), passing is one of the essential basic techniques for basketball students or players to master, as a successful game strategy requires good passing skills. Effective passing allows for swift and smooth ball movement, thereby facilitating a team's offensive efforts against the opponent's defense. One of the most common passing techniques is the chest pass, where the ball is thrown to a teammate with two hands from the chest area. This technique is usually used for short-distance passes that require precision and accuracy, typically when a teammate is open or not closely guarded by opponents. A basketball player should master this passing technique, as it helps build teamwork during the game. To execute this technique, one cannot rely solely on technical proficiency but must also possess physical capabilities. One of the essential physical attributes required is arm muscle power.

Arm muscle power refers to the physical condition that represents the muscles' ability to generate maximum force or energy in the arms. In basketball, performing a chest pass requires a strong push from both hands in front of the chest, highlighting the importance of arm muscle power. A player with greater arm muscle power will find it easier to execute chest passes during a game. According to the Indonesian Law No. 11 of 2022 on Sports, in Article 18, paragraph 2, it states: "Educational sports, as referred to in paragraph (1), are implemented both in formal education through curricular and/or extracurricular activities, and in non-formal education through activities that meet specific needs." According to Fitrah et al., (2021) the use of ball throws (passing), especially chest high throws (chest passes), is to carry out attacks, throw-ins, short-range passes, infiltrate the opponent's defense and so on because of the chest pass (chest throw) is usually done quickly and strongly, of course adjusted to the distance. Apart from that (Burhan & Herlina, 2022) also stated that the chest pass is a very effective type of passing, especially when the player is not being guarded.

In line with this law, Muara Pinang 1 Public Senior High School offers a basketball extracurricular program for students interested in this sport. However, based on the researcher's observations, many male students in this program struggle with chest passes, often appearing hesitant when attempting to pass and lacking an understanding of the physical components involved, such as arm length and arm muscle power. A good chest pass requires coordination between arm length and muscle power, which are crucial factors in basketball.

This issue represents a fundamental problem that can have a significant impact on basketball game outcomes. If each player can pass effectively, the chances of scoring and winning the game increase. In this study, the first step is to measure the arm length and arm muscle power of the students to identify what factors can improve their chest pass skills. However, this study will not focus on specific training methods for these variables, as it is a correlational study aimed at measuring arm length and muscle power and then examining their relationship with the chest pass ability of male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School.

Based on the above explanation, the physical factors that will be examined in this study are arm length and arm muscle power. This has prompted the researcher to investigate the existing issue in depth, leading to the study titled "The Relationship Between Arm Length and Arm Muscle Power with the Chest Pass Ability of Male Students in the Basketball Extracurricular Program at Muara Pinang 1 Public Senior High School."

METHODS

This study is designed using a correlational research design. According to (Darmawan et al., 2020), correlational research is used to determine the level of relationship between two or more variables, namely the independent variable and the dependent variable. In this context, the independent variables are arm length (X1) and arm muscle power (X2), while the dependent variable is the chest pass ability (Y).

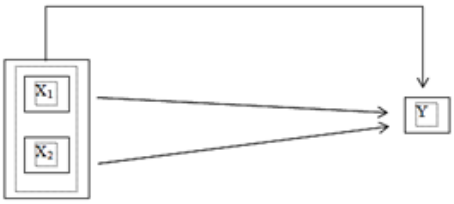

Figure 1. Research Design
Source: Sugiyono (2013)

Description:
X1 : Arm Lenght
X2 : Arm Muscle Power
Y : Chest Pass Ability

According to (Arikunto, 2013), a sample is a portion or representative of a population under study. Arikunto also states that "If the population size is less than 100, the entire population can be used as a sample (total sampling)." Following this guideline, the sample in this study consists of 30 students from the basketball extracurricular program at Muara Pinang 1 Public Senior High School.

Based on the instrument used to measure arm length, the anthropometer or measuring tape, the measurement is performed once and recorded to the nearest tenth of a centimeter. According to (Ismaryati, 2008:100), arm length is measured from the acromion to the tip of the middle finger. The procedure for conducting this measurement is as follows:

a. The student stands in an anatomical position on a flat surface.
b. The arm length is then measured from the acromion to the tip of the middle finger.

Table 1. Assessment Arm Lenght Norms Test

Information	Results (cm)
Excellent	>75
Good	71-75
Currently	66-70
Less	60-65
Very Less	<60

Source : (Kurniawan,2015)

Two Hand Medicine Ball Put

Purpose: To measure the strength of the arms and shoulders.

Target Participants: Male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School.

Equipment:

1. A medicine ball weighing 2.7216 kg.
2. Chalk or colored tape.
3. Soft rope for body restraint.
4. Bench.
5. Measuring tape.

Procedure:

1. The student sits on a bench with a straight back.
2. The student holds the medicine ball with both hands in front of their chest, under their chin.
3. The student pushes the ball as far as possible, keeping their back against the bench's backrest. A rope is used to restrain the student's body while pushing the ball.
4. The student performs this three times.
5. Before the test, the student may perform one trial attempt.

Scoring:

1. The distance is measured from the point where the ball lands to the edge of the bench.
2. The score is the longest distance achieved out of the three attempts.

Table 2. Assessment Two Hand Medicine Ball Put Norms Test

Information	Results (cm)
Excellent	>5
Good	4,6-5
Currently	4,1-4,5
Less	3,5-4
Very Less	<3,5

Source : (Ismaryati, 2008)

Wall Bounce Test

Procedure:

1. A target is drawn on a wall, as shown in the diagram.
2. The student stands behind the boundary line with a ball in hand.
3. At the signal, the student throws the ball at the target on the wall using a chest pass.
4. The ball that bounces off the wall must be caught and then thrown back to the target as many times as possible within 15 seconds.
5. The ball must not touch the floor and cannot be volleyed.
6. The student's score is the number of times the ball is caught after bouncing off the wall within the 15-second time frame.

Table 3. Assessment Wall Bounce Norms Test

Information	Results (cm)
Excellent	>26
Good	23-26
Currently	19-22
Less	15-18
Very Less	<15

Source : (Arsil & Adnan, 2010)

Data analysis is a method employed to scrutinize acquired data, aiming to validate hypotheses in research. The formulation used to explore the relationship between independent and dependent variables is through multiple regression analysis. To adhere to the requirements and conditions of data analysis, normality and linearity tests are conducted.

RESULTS AND DISCUSSION

Description of Arm Length Measurement Results

In this study, arm length was measured using a measuring tape to determine the relationship between arm length and the chest pass ability in basketball. Initially, before measuring arm length, the students were gathered and called individually in order to conduct the measurements. After this step, the students proceeded with the tests in the specified order. The results of the arm length measurements can be found in the attached **Table 4.**

Table 4. Distribution List of Arm Lenght Measurement Results

Results	Fi	Xi	Xi2	Fi.Xi	Fi.Xi2
63 - 64	6	63,5	4032,25	381	24193,5
65 - 66	11	65,5	4290,25	720,5	47192,75
67 - 68	3	67,5	4556,25	202,5	13668,75
69 - 70	6	69,5	4830,25	417	28981,5
71 - 72	2	71,5	5112,25	143	10224,5
73 - 74	2	73,5	28223,5	147	135065,5
∑	**30**	**411**	**28223,5**	**2011**	**135065,5**

Description of Arm Muscle Power Test

This study used the two-hand medicine ball put test to measure the arm muscle power of the students and to understand its relationship with the chest pass ability in basketball. At the initial stage, students were gathered, then called individually according to their assigned numbers. Once all the students had completed the two-hand medicine ball put test, the results for arm muscle power were obtained. These results are available in the attached **Table 4.**

Table 5. Distribution List of Arm Muscle Power Test Results

Results	Fi	Xi	Xi2	Fi.Xi	Fi.Xi2
3,10-3,45	5	3,15	9,92	15,75	49,61
3,46-3,81	3	3,71	13,76	11,13	41,29
3,82-4,17	14	4,02	16,16	56,28	226,24
4,18-4,53	3	4,3	18,49	12,9	55,47
4,54-4,89	3	4,63	21,43	13,89	64,31
4,90-5,25	2	5,12	26,26	10,25	52,52
∑	**30**	**24,93**	**106,03**	**120,2**	**489,45**

Description of Chest Pass Ability Test Results

The study utilized the wall bounce test to assess the chest pass ability of students and to explore the relationship between arm length, arm muscle power, and chest pass ability. Initially, students were gathered, then called individually according to their assigned numbers. Once all students completed the wall bounce test, the chest pass ability test results were collected. These results are available in the attached data set **Table 6.**

Table 6. Distribution List of Chest Pass Ability Test Results

Results	Fi	Xi	Xi2	Fi.Xi	Fi.Xi2
10 – 11,5	3	10,6	112,36	31,8	337,08
11,6 - 13	5	12,4	153,76	62	768,8
13,1-14,5	5	14	196	70	980
14,6 - 16	11	15,5	240,25	170,5	2642,75
16,1-17,5	4	17	289	68	1156
17,6 - 19	2	18,5	342,25	37	684,5
∑	**30**	**88**	**1333,62**	**439,3**	**6569,13**

Multicollinearity Test

The Pearson product-moment correlation is intended to provide a depiction of variable changes within the study and to determine whether multicollinearity exists among the independent or predictor variables before proceeding with multiple regression analysis. Multicollinearity occurs if the intercorrelation among predictors is greater than or equal to 1. Multicollinearity can lead to striking correlation indices if one variable is controlled. The Results was ∑x1^2=272,7, ∑x2^2=8, ∑y^2=140,67, ∑x1y=171, ∑x2y=29,29, ∑x1x2=35,67.

Correlation Test X1 and X2

$$r_{x1x2} = (\sum x1x2)/\sqrt{((\sum x1^2)(\sum x2^2))}$$
$$= 35,67/\sqrt{((272,7)(8))}$$
$$= 35,67/\sqrt{2181,6}$$
$$= 35,67/46,7$$
$$= 0,76$$

Correlation Test X1 and Y

rX1Y = (∑x1y)/√((∑x1^2)(∑y^2))
= 171/√((272,7)(140,67))
= 171/√38360,7
= 171/195,86
= 0,87

Correlation Test X2 and Y

rX2Y = (∑x2y)/√((∑x2^2)(∑y^2))
= 29,29/√((8)(140,67,)
= 29,29/√1125,36
= 29,29/33,55
= 0,87

Multiple Correlation Test

Based on the calculation results, the null hypothesis is rejected, indicating a significant relationship between arm length and arm muscle power with chest pass ability at a 5% level of significance (F calculated > F table). A summary of the multiple regression analysis is presented in the following **Table 7.**

Table 7. Multiple Regression Results

Multiple Regression	Fcount	Ftable	Conclusion
X1,X2 Terhadap Y	181,17	3,35	Signifikan

From the results in the **Table 7**, it can be seen that the calculated F value is X, while the table F value is Y. This leads to the conclusion that both arm length and arm muscle power can jointly be used as predictors for chest pass ability.

Testing rules:

- If F_calculated ≥ F_table, reject the null hypothesis, meaning the correlation is significant.
- If F_calculated ≤ F_table, accept the null hypothesis, meaning the correlation is not significant.

Given that the F_calculated (181.17) is greater than the F_table (3.35), it can be concluded that there is a significant relationship between arm length and arm muscle power with chest pass ability. Therefore, we can infer that arm length and arm muscle power, together, can be used as predictors for chest pass ability, leading to the following regression line equation:

Y = a+b1x1+b2x2
Y = -18,29 + 0,37 x1 + 2,03 x2

The results of the analysis examining the relationship between the two independent variables and the dependent variable need further examination to interpret the correlation between the obtained results and the underlying theories that support this research. This explanation is necessary to understand whether the proposed theories align with the findings of the study. The following is the explanation to describe the connection between the independent variables and the dependent variable.

Relationship Between Arm Length and Chest Pass Ability

The relationship between arm length and chest pass ability in basketball can be interpreted by measuring the correlation coefficient (r). According to the research conducted by measuring the arm length of male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School, it was found that the correlation coefficient between arm length and chest pass is 87% or r = 0.87, which falls under the category of a very strong relationship. This indicates that there is a connection between arm length and the ability to perform chest passes among male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School. These results suggest that arm length is a crucial component in executing chest passes.

According to Ismaryati, (2008), arm length is measured from the acromion to the tip of the middle finger. Arm muscles are part of the body that functions as a means of upper movement. Humans have a lot of muscles between the upper arm (between the shoulder and elbow) and also the lower arm (between the elbow and wrist) (Putra, 2017).The procedure involves the student standing in an anatomical position on a flat surface, and then measuring the arm length from the acromion to the tip of the middle finger. Arm length is related to the reach during passing movements such as the chest pass. We can infer that the longer a person's arm, the greater the reach, which can lead to better accuracy and effectiveness in passing. From the explanation above, it can be concluded that arm length is a significant element in executing chest passes.

Relationship Between Arm Muscle Power and Chest Pass Ability

The relationship between arm muscle power and chest pass ability in basketball can be interpreted by measuring the correlation coefficient (r). The correlation coefficient between arm muscle power and chest pass is 87%, or r = 0.87, which indicates a very strong level of correlation. This suggests that there is a significant relationship between arm muscle power and chest pass ability among male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School. These findings indicate that arm muscle power is a key component that contributes to chest pass performance.

According to Sastra et al., (2018), arm muscle power is the strength generated by the arm muscles when they contract maximally to exert force against resistance. Additionally, Arwih, (2019) mentions that arm muscle power is a supporting factor in many sports, particularly those that require hand strength. Given this, we can infer that to perform a chest pass effectively, one needs considerable arm muscle power to send the ball to a designated teammate. The greater a person's arm muscle power, the better their passing ability. It is evident that arm muscle power plays an important role in executing a chest pass

Relationship Between Arm Length and Arm Muscle Power with Chest Pass Ability

The results of the study indicate that arm length and arm muscle power together have a significant relationship with chest pass ability, evidenced by an F-value of 181.17, which is greater than the F-table value of 3.35. The multiple correlation coefficient (r) between the independent variables and the dependent variable shows a strong relationship, with a calculated value of 0.93 and a coefficient of determination of 0.8649, placing it in the category of a very strong relationship. This suggests that there is a substantial correlation between arm length and arm muscle power with the chest pass ability of male students in the basketball extracurricular program at Muara Pinang 1 Public Senior High School. The positive value of r indicates that students with greater arm length and arm muscle power will likely have better chest pass skills in basketball. According to Syukur et al., (2019) arm muscle power is a physical condition that cannot be separated and is the main support for movement, namely muscle strength and muscle speed to exert maximum power.

All the independent variables in basketball collectively contribute significantly to chest pass ability. When performing a chest pass, arm length and arm muscle power are interrelated. Arm length provides a significant correlation, with a coefficient of 0.87, while arm muscle power contributes equally with the same correlation value of 0.87. Combined, these two independent variables exhibit a very strong correlation with a multiple correlation coefficient of 0.93. This study demonstrates that both arm length and arm muscle power play significant roles in executing chest passes. Therefore, in basketball, having a good arm length and strong arm muscles is crucial for effective passing skills.

CONCLUSION

Based Based on the results of the study, the following conclusions can be drawn; there is a relationship between arm length and chest pass ability, there is a relationship between arm muscle power and chest pass ability, there is a relationship between arm length and arm muscle power together with chest pass ability.

REFERENCES

Arikunto. (2013). Prosedur Penelitian Suatu Pendekatan Praktik. Jakarta: Rineka Cipta.

Arsil & Adnan, A. (2010). Evaluaisi Pendidikan Jasmani dan Olahraga. Padang. Wineka Media. https://www.bing.com/ck/a?!&&p=ba5b99acd0ce3c8dJmltdHM9MTcxOTYxOTIwMCZpZ3VpZD0xYmFmOTk3YS04MzA0LTY3N2EtMjQyOC05NjZkODJhODY2YTUmaW5zaWQ9NTE4OQ&ptn=3&ver=2&hsh=3&fclid=1baf997a-8304-677a-2428-966d82a866a5&psq=Arsil+%26+Adnan%2C+A.+(2010).+Evaluaisi+Pendidikan+Jasmani+dan+Olahraga.+Padang.+Wineka+Media.&u=a1aHR0cHM6Ly9vcGFjLnBlcnB1c25hcy5nby5pZC9EZXRhaWxPcGFjLmFzcHg_aWQ9OTM0OTY0&ntb=1

Arwih, M. Z. (2019). Hubungan Kelincahan Dengan Kemampuan Menggiring Pada Permainan Bolabasket Mahasiswa Jurusan Ilmu Keolahragaan Angkatan 2017 FKIP UHO. Jurnal Ilmu Keolahragaan, Fakultas Ilmu Keolahragaan, UNiversitas Negeri Medan, 18(1), 63–71. https://garuda.kemdikbud.go.id/documents/detail/1260299

Burhan, Z., & Herlina, H. (2022). Perbandingan Pengaruh Latihan Pull Up Dan Push Up Terhadap Peningkatan Keterampilan Chest Pass Ekstrakurikuler Bola Basket. Jurnal Ilmiah Global Education, 3(1), 48–52. ejournal.nusantaraglobal.ac.id/index.php/jige

Darmawan, A. F., Pratama, D. S., & Kusumawardhana, B. (2020). Spesifikasi Komponen Kondisi Fisik Chest Pass Atlet Putri di Ekstrakurikuler Bola Basket SMP Negeri 7 Pemalang. Majalah Lontar, 32(2), 1–11. https://doi.org/10.26877/ltr.v32i2.7069

Fitrah, F., Bayu, W. I., & Iyakrus, I. (2021). Pengaruh Latihan Push Up Terhadap Hasil Passing Chest Pass Pada Ekstrakurikuler Bola Basket. Corner: Jurnal Pendidikan Jasmani Dan Olahraga, 2(1), 24–28. https://doi.org/https://orcid.org/0000-0002-0650-8783

Harliawan, M., Imran Hasanuddin, M. (2023). Analisis Passing Chest Pass Permainan Bola Basket Siswa SMA Negeri 10 Makassar. Journal on Education, 01(06), 1133–1139.

Ismaryati. (2008). Tes dan Pengukuran olahraga. Surakarta : (LPP) UNS Press. https://opac.perpusnas.go.id/

Iyakrus, I. (2018). Pendidikan Jasmani, Olahraga Dan Prestasi. Altius: Jurnal Ilmu Olahraga Dan Kesehatan, 7(2). https://doi.org/https://doi.org/10.36706/altius.v7i2.8110

Jati, W. S. (2019). Strategi Penerapan Marketing Mix (4p) Pada Pemasaran Produk Uwitan Wooden Craft. Universitas Islam Indonesia. https://dspace.uii.ac.id/

Kurniawan, Y. (n.d.). Hubungan Panjang Lengan Dan Power Otot Tungkai Terhadap Kemampuan Smash Dalam Permainan Bola Volly Pada Siswi Putri Kelas X Smk Pgri 3 Kediri Tahun Ajaran 2014/2015. https://www.bing.com/ck/a?!&&p=03f6b43f0f9aefbfJmltdHM9MTcxOTYxOTIwMCZpZ3VpZD0xYmFmOTk3YS04MzA0LTY3N2EtMjQyOC05NjZkODJhODY2YTUmaW5zaWQ9NTE4OA&ptn=3&ver=2&hsh=3&fclid=1baf997a-8304-677a-2428-966d82a866a5&psq=Kurniawan%2C+Y.+(2015).+Hubungan+Panjang+Lengan+Dan+Power+Otot+Tungkai+Terhadap+Kemampuan+Smash+Dalam+Permainan+Bola+Volly+Pada+Siswi+Putri+Kelas+X+SMK+PGRI+3+Kediri+Tahun+Ajaran+2014%2F2015&u=a1aHR0cDovL3NpbWtpLnVucGtlZGlyaS5hYy5pZC9tYWhhc2lzd2EvZmlsZV9hcnRpa2VsLzIwMTUvMTEuMS4wMS4wOS4xMTc0LnBkZg&ntb=1

Putra, M. A. (2017). Kontribusi Kekuatan Otot Lengan, Terhadap Kemampuan Renang Dasar Gaya Bebas 50 Meter SMA N 1 Ujungbatu Provinsi Riau. Edu Research, 6(2), 47–60. https://doi.org/https://e-journal.upp.ac.id/index.php/EDU/article/view/1510

Sastra, I., Sukirno, S., & Yusfi, H. (2018). Hubungan Power Otot Lengan Dan Kelentukan Togok Dengan Hasil Smash Open Pada Kegiatan Ekstrakurikuler Bola Voli. Altius: Jurnal Ilmu Olahraga Dan Kesehatan, 7(1). https://doi.org/https://doi.org/10.36706/altius.v7i1.8125

Sugiyono. (2013). Metode Penelitian Pendidikan dengan Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta.

Syukur, M. R., Kastrena, E., & Suryakancana, U. (2019). Kontribusi Daya Ledak Otot Lengan Dan Daya Ledak Otot Tungkai Terhadap Hasil Smash. Jurnal Maenpo: Jurnal Pendidikan Jasmani Kesehatan Dan Rekreasi, 9(1), 23–29. https://jurnal.unsur.ac.id/maenpo.

Undang-Undang Republik Indonesia Nomor 11 Tahun 2022 tentang Keolahragaan, Pemerintah (2022).

Victorian, A. R., & Sari, N. (2019). Pengaruh Latihan Squat Thrust Terhadap Kemampuan Lemparan Over Head Pass Dalam Permainan Bola Basket. Altius : Jurnal Ilmu Olahraga Dan Kesehatan. Volume 8 No 1, Hal 38-43., 8(1), 38–43. https://doi.org/https://doi.org/10.36706/altius.v8i1.8387.