THE DEVELOPMENTAL PATHWAY, TRAINING STRUCTURE AND EFFECT OF SMALL-SIDED GAMES ON ELITE U-22 SOCCER PLAYERS

MOHD FARIDZ BIN HAJI AHMAD

UNIVERSITI PENDIDIKAN SULTAN IDRIS

2022

THE DEVELOPMENTAL PATHWAY, TRAINING STRUCTURE AND EFFECT OF SMALL-SIDED GAMES ON ELITE U-22 SOCCER PLAYERS

MOHD FARIDZ BIN HAJI AHMAD

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

THESIS PRESENTED TO QUALIFY FOR A DOCTOR OF PHILOSOPHY

FACULTY OF SPORTS SCIENCE AND COACHING
UNIVERSITI PENDIDIKAN SULTAN IDRIS

2022

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

Please tick (√)
Project Paper
Masters by Research
Master by Mixed Mode
PhD

✓

INSTITUTE OF GRADUATE STUDIES

DECLARATION OF ORIGINAL WORK

This declaration is made on the 9 day of 8 20 22

i. Student's Declaration:

I, Mohd Faridz Haji Ahmad (P20172002384) Faculty of Sports Science and Coaching (PLEASE INDICATE STUDENT'S NAME, MATRIC NO. AND FACULTY) hereby declare that the work entitled The Developmental Pathway, Training Structure and Effect of Small-Sided Games on Elite U-22 Soccer Players is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

Signature of the student

ii. Supervisor's Declaration:

I Prof. Madya Dr. Jeffrey Low Fook Lee (SUPERVISOR'S NAME) hereby certifies that the work entitled The Developmental Pathway, Training Structure and Effect of Small-Sided Games on Elite U-22 Soccer Players (TITLE) was prepared by the above named student, and was submitted to the Institute of Graduate Studies as a * partial/full fulfillment for the conferment of Doctor of Philosophy (Sports Coaching) (PLEASE INDICATE THE DEGREE), and the aforementioned work, to the best of my knowledge, is the said student's work.

17 August 2022
Date

Signature of the Supervisor

PROF. MADYA DR. JEFFREY LOW FOOK LEE
PENSYARAH KANAN
JABATAN SAINS KEJURULATIHAN
FAKULTI SAINS SUKAN DAN KEJURULATIHAN
UNIVERSITI PENDIDIKAN SULTAN IDRIS
35900 TANJUNG MALIM
PERAK DARUL RIDZUAN

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

INSTITUT PENGAJIAN SISWAZAH /
INSTITUTE OF GRADUATE STUDIES

BORANG PENGESAHAN PENYERAHAN TESIS/DISERTASI/LAPORAN KERTAS PROJEK
DECLARATION OF THESIS/DISSERTATION/PROJECT PAPER FORM

Tajuk / *Title*: The Developmental Pathway, Training Structure and Effect of Small-Sided Games on Elite U-22 Soccer Players

No. Matrik /*Matric's No.*: P20172002324

Saya / *I* : Mohd Faridz Hajj Ahmad

(Nama pelajar / *Student's Name*)

mengaku membenarkan Tesis/Disertasi/Laporan Kertas Projek (Kedoktoran/Sarjana)* ini disimpan di Universiti Pendidikan Sultan Idris (Perpustakaan Tuanku Bainun) dengan syarat-syarat kegunaan seperti berikut:-
acknowledged that Universiti Pendidikan Sultan Idris (Tuanku Bainun Library) reserves the right as follows:-

1. Tesis/Disertasi/Laporan Kertas Projek ini adalah hak milik UPSI.
   The thesis is the property of Universiti Pendidikan Sultan Idris
2. Perpustakaan Tuanku Bainun dibenarkan membuat salinan untuk tujuan rujukan dan penyelidikan.
   Tuanku Bainun Library has the right to make copies for the purpose of reference and research.
3. Perpustakaan dibenarkan membuat salinan Tesis/Disertasi ini sebagai bahan pertukaran antara Institusi Pengajian Tinggi.
   The Library has the right to make copies of the thesis for academic exchange.
4. Sila tandakan (√) bagi pilihan kategori di bawah */ Please tick (√) for category below:-*

☐	**SULIT/*CONFIDENTIAL***	Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia seperti yang termaktub dalam Akta Rahsia Rasmi 1972. / *Contains confidential information under the Official Secret Act 1972*
☐	**TERHAD/*RESTRICTED***	Mengandungi maklumat terhad yang telah ditentukan oleh organisasi/badan di mana penyelidikan ini dijalankan. / *Contains restircted information as specified by the organization where research was done.*
☑	**TIDAK TERHAD / *OPEN ACCESS***	

(Tandatangan Pelajar/ Signature)

Tarikh: 17 August 2022

(Tandatangan Penyelia / *Signature of Supervisor*)
& (Nama & Cop Rasmi / *Name & Official Stamp*)

PROF MADYA DR. JEFFREY LOW FOOK [illegible]
PENSYARAH KANAN
JABATAN SAINS KEJURULATIHAN
FAKULTI SAINS SUKAN DAN KEJURULATIHAN
UNIVERSITI PENDIDIKAN SULTAN IDRIS
[illegible]
[illegible]

Catatan: Jika Tesis/Disertasi ini **SULIT @ TERHAD**, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan ini perlu dikelaskan sebagai **SULIT** dan **TERHAD**.

Notes: If the thesis is CONFIDENTAL or RESTRICTED, please attach with the letter from the organization with period and reasons for confidentiality or restriction.

ACKNOWLEDGEMENT

Bismillahirrahmanirrahim and Assalammualaikum wbt.

Alhamdulillah. First and foremost the expression of my gratitude to Allah SWT for giving me the strength and understand in completing this thesis. It becomes a pleasure when the thesis comes to the end, by this, I would like to express my gratitude towards my main supervisor, Prof. Madya Dr. Jeffrey Low Fook Lee and co supervisor, Dr. Ali Md Nadzalan for their advice and guidance throughout the completion of the thesis. With their understanding, patient and cheerfulness, it always helped ease my ongoing stress. In addition, thank you also for their knowledge and expertise also make me ease to complete thesis. Thank you for vigilantly guiding me and keeping me focus on the right spot. Special dedications also delivered to my beloved parents Mr. Haji Ahmad Bin Mat Noor and Madam Hjh. Che Fatimah Binti Sharif for all encouragement especially in terms of financial supports and motivation. I also would like to give appreciations to my wife, Madam Nur Haida Binti Abdul Razak, my son, Muhammad Faris Harraz, my daughter, Nur Fidellia Hayfa and also my sister, Madam Nur Farahin Binti Haji Ahmad for their valuable times by supporting me in completing my journey. I also would like to thank to all my participants, their coaches, coaching team and also team management for their permissions granted and gave me a good cooperation to complete this study. Other than that, I would like to thanks to my entire research assistants who were willing to spend their time in assisting me. I thank to all my friends for their support and efforts either through directly or indirectly involved in completing this thesis. Thank you and May God blesses all of you. Wassalam.

ABSTRACT

The objective of this study was to identify the developmental pathway, to identify the microstructure of training activities and to investigate the effectiveness of small-sided games (SSG) on technical skills and fitness components after 6 weeks of training program on elite U-22 soccer players and then compare it to university-based soccer players. The methodology that had been used were questionnaire (PHQ) in identifying athletes practice histories, video recording as to analysing the types of practice activities and testing battery such as Agility T-Test (agility), 30-m Sprint Test (speed), YYIRTL1 (cardiovascular endurance), LSPT (passing) and Slalom Dribble Test (dribbling) as to investigate the effect of SSG training. The findings indicated that elite u-22 soccer players had started late, spent less time in unstructured activities and participated less number in other sports as it found to statistically difference as being compared to university-based players. Other than that, the practice activities for u-22 players had contain more training form activities while found to be no significant difference when compared it between groups. Lastly, there was a significant difference within group at all variables except for agility and found a significant result on dribbling, speed and VO_2max when compared between group. In conclusion, this finding provide the scientific data relating to elite performers' pathway, types of activities used on elite practice activities and the SSG implementation to improve performance. The findings of this study may contribute to a better coaching sciences body of knowledge.

POLA LALUAN PERKEMBANGAN, STRUKTUR LATIHAN DAN KESAN LATIHAN SMALL-SIDED GAMES TERHADAP PEMAIN BOLASEPAK ELIT BAWAH 22 TAHUN

ABSTRAK

Objektif kajian ini adalah untuk mengenal pasti laluan perkembangan, mikrostruktur aktiviti latihan dan menyiasat keberkesanan latihan permainan berskala kecil (SSG) terhadap kemahiran teknikal dan komponen kecergasan selepas 6 minggu program latihan bolasepak terhadap pemain elit B-22 dan kemudian membandingkannya dengan pemain bolasepak universiti. Metodologi yang digunakan ialah soal selidik (PHQ) dalam mengenal pasti sejarah latihan atlet, rakaman video untuk menganalisis jenis aktiviti latihan dan ujian bateri iaitu Ujian Ketangkasan T (ketangkasan), Ujian Pecutan 30 m (kelajuan), YYIRTL1 (daya tahan kardiovaskular), LSPT (hantaran) dan Ujian Mengelecek Slalom (mengelecek) untuk mengkaji kesan latihan SSG. Dapatan kajian menunjukkan bahawa pemain bolasepak elit B-22 telah bermula lewat, menghabiskan sedikit masa dalam aktiviti tidak berstruktur dan kurang menyertai sukan lain kerana mereka berbeza secara statistik apabila dibandingkan dengan pemain universiti. Selain itu, aktiviti latihan untuk pemain B-22 telah mengandungi lebih banyak aktiviti "training form" manakala didapati tidak terdapat perbezaan yang ketara jika dibandingkan antara kedua-dua kumpulan. Akhir sekali, terdapat perbezaan yang signifikan di dalam kumpulan pada semua pembolehubah kecuali ketangkasan dan terdapat keputusan yang signifikan pada komponen kelajuan, VO_2max dan mengelecek jika dibandingkan antara kumpulan. Kesimpulannya, dapatan ini menyediakan data saintifik berkaitan laluan perjalanan pemain elit B-22, jenis aktiviti yang digunakan dalam latihan dan pelaksanaan SSG untuk meningkatkan prestasi. Dapatan kajian ini boleh menyumbang kepada badan ilmu kejurulatihan yang lebih baik.

TABLE OF CONTENTS

		Pages
DECLARATION OF ORIGINAL WORK		ii
DECLARATION OF THESIS		iii
ACKNOWLEDMENT		iv
ABSTRACT		v
ABSTRAK		vi
TABLE OF CONTENTS		vii
LIST OF TABLES		xiii
LIST OF FIGURES		xv
LIST OF ABBREVIATIONS		xviii
CHAPTER 1 INTRODUCTION		1
1.1	Background Research	1
1.2	Problem Statement	35
1.2.1	Coaches Perspective Survey	39
1.2.2	Study 1	42
1.2.3	Study 2	43
1.2.4	Study 3	44
1.3	Objective of the study	45
1.4	Research Hypothesis	46
1.5	Operational Definition	47
1.5.1	Developmental Pathways	47
1.5.2	Training Form	48

	1.5.3 Playing Form	48
	1.5.4 Others (transition)	49
	1.5.5 Small-Sided Games (SSG)	49
	1.5.6 Agility	49
	1.5.7 Speed	50
	1.5.8 Cardiovascular Endurance	50
	1.5.9 Dribbling	50
	1.5.10 Passing	51
	1.5.11 Elite U-22 Soccer Players	51
	1.5.12 University-Based Soccer Players	51
1.6	Limitations of the Study	51
1.7	Delimitations of the Study	52
1.8	Importance of Research	53
1.9	Summary	53
CHAPTER 2	**LITERATURE REVIEW**	54
2.1	Introduction	54
2.2	Selection of Soccer Players (Talent Identification and Development)	55
2.3	Developmental Pathway towards Expert Performance	64
	2.3.1 Developmental pathway among soccer players	74
	2.3.2 Developmental pathway among Malaysian athletes	76
2.4	Microstructure of practice activities	77
	2.4.1 Training Form and Playing Form Activities	81

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

2.5	Small-Sided Games (SSG)	84
	2.5.1 Study of the effect of SSG training in Malaysia	86
	2.5.2 The effect of SSG on agility among soccer players	88
	2.5.3 The effect of SSG on speed	89
	2.5.4 The effect of SSG on cardiovascular endurance	92
	2.5.5 The effect of SSG on passing	95
	2.5.6 The effect of SSG on dribbling	98
	2.5.7 The effect of SSG on fitness components and technical abilities	100
	2.5.8 Test and Reliability	103
2.6	Summary	106
CHAPTER 3	**STUDY 1**	109
3.1	Introduction	109
3.2	Research Approach	113
3.3	Population and sample / participant / subject / case	114
3.4	Instruments	114
	3.4.1 Reliability	114
3.5	Data Collection Procedure	117
3.6	Methods / Techniques of Analysing Data	118
	3.6.1 Independent and Dependent Variable	119
3.7	Findings	120
	3.7.1 Normality Test	120
	3.7.2 Inferential Statistics	125

3.8 Discussion 133

3.8.1 Age Milestone 133

3.8.2 Soccer-related Activities 140

3.8.3 Other sports participation 145

CHAPTER 4 STUDY 2 146

4.1 Introduction 146

4.2 Research Approach 150

4.3 Population and sample / participant / subject / case 151

4.3.1 Independent and Dependent Variable 151

4.4 Instruments 151

4.4.1 Reliability 151

4.5 Data Collection Procedure 155

4.6 Methods / Techniques of Analysing Data 157

4.7 Findings 157

4.7.1 Normality Test 157

4.7.2 Demographic Data 162

4.7.3 Inferential Statistics 164

4.8 Discussion 164

CHAPTER 5 STUDY 3 168

5.1 Introduction 168

5.2 Research Approach 170

5.3 Population and sample / participant / subject / case 171

5.3.1 Independent and Dependent Variable 172

5.4	Instruments	172
	5.4.1 Reliability	172
5.5	Data Collection Procedure	173
	5.5.1 Agility T-test (Agility)	177
	5.5.2 30 m Sprint Test (Speed)	179
	5.5.3 Yo-Yo Intermittent Recovery Tests Level 1 (Cardiovascular Endurance)	180
	5.5.4 Loughborough Soccer Passing Test (Passing)	181
	5.5.5 Slalom Dribble Test (Dribbling)	183
5.6	Methods / Techniques of Analysing Data	189
5.7	Findings	190
	5.7.1 Normality Test	190
	5.7.2 Demographic Data	194
	5.7.3 Inferential Statistics	197
5.8	Discussion	202
	5.8.1 Agility	202
	5.8.2 Speed	205
	5.8.3 Cardiovascular Endurance	207
	5.8.4 Passing	211
	5.8.5 Dribbling	214
CHAPTER 6	**GENERAL DISCUSSION, FUTURE RESEARCH RECOMMENDATION AND CONLCUSION**	217
6.1	Introduction	217
6.2	General Discussion	218

6.2.1 Study 1 218

6.2.2 Study 2 222

6.2.3 Study 3 223

6.3 Recommendation 224

6.4 Conclusion 225

6.5 Practical Implication 226

REFERENCES 229

APPENDIX

LIST OF TABLES

Table No.		Pages
1.1	Element of Deliberate Practice and Play	16
1.2	Statistics on participation and achievement of Malaysian youth soccer team from 2010 – 2020	36
2.1	Malaysian Soccer Projects	60
2.2	Early-Late Specialization Model by Balyi et al. (2014)	61
2.3	The characteristics of deliberate practice by K. A. Ericsson et al., (1993) and deliberate play by Côté et al., (2007) in sports	66
2.4	Method used in determining the sports developmental history	69
2.5	Activities and sub-activities of microstructure of practice from previous studies	78
2.6	The definition of activities and sub-activities	80
2.7	A study of SSG training effectiveness in Malaysia	87
2.8	SSG effectiveness on agility of soccer players	89
2.9	SSG effectiveness on speed of soccer players	91
2.10	SSG effectiveness on cardiovascular endurance of soccer players	94
2.11	SSG effectiveness on passing skill of soccer players	97
2.12	SSG effectiveness on dribbling skill of soccer players	99
2.13	SSG effectiveness on fitness components and technical abilities simultaneously	100
2.14	SSG Training summary	102
2.15	Field test for soccer players	105
3.1	Test-retest reliability for pre and post PHQ questionnaire	117
3.2	The independent and dependent variables	120

3.3	Normality test using skewness and kurtosis for soccer-related activities	124
3.4	Normality test using Kolmogorov-Smirnov and Shapiro-Wilk for other sports participation	125
3.5	Statistical analysis (repeated measure ANOVA) for test within-subjects effects	129
3.6	Statistical analysis (repeated measure ANOVA) for test between-subjects effects	129
3.7	Descriptive statistics mean rank for other sports participation	132
3.8	Statistical analysis (Mann-Whitney U test) for other sports participation	132
4.1	The independent and dependent variables	151
4.2	Percentage agreement for inter-rater reliability	153
4.3	Percentage agreement for intra-rater reliability	154
4.4	Categories of training	156
4.5	Statistical analysis (MANOVA) for within-between subjects	164
5.1	The independent and dependent variables	172
5.2	The reliability value from previous studies	173
5.3	SSG Training Program for 6 weeks	174
5.4	RPE scale data for elite u-22 soccer players	187
5.5	Normality test using Kolmogorov-Smirnov and Shapiro-Wilk	190
5.6	Normality test using skewness and kurtosis	192
5.7	Anthropometric data for elite u-22 and university-based soccer players	194
5.8	Multivariate test (within subjects)	198
5.9	Multivariate test (between subjects)	200

LIST OF FIGURES

Figure No.		Pages
1.1	Duration of coaching experience	39
1.2	Respond on the effectiveness of soccer development program	40
1.3	Types of activities towards becoming an elite performer	41
1.4	The effectiveness of SSG training on soccer players	42
2.1	Talent Development in Malaysia	57
2.2	Potential predictors of talent in soccer (Williams & Reilly, 2000)	62
2.3	Multidimensional Assessment Approach of Talent Identification in Malaysian Male Youth Soccer Players	64
2.4	The Developmental Model of Sport Participation (DMSP) by Côté and collegue (Côté & Hay, 2002; Côté et al., 2003; Côté, 1999)	68
2.5	Model of the analysis of SSG variables adopted from Halouani et al., (2014)	86
2.6	Framework of components of developmental pathway towards elite performance	106
2.7	Framework of types of microstructure activities and sub-activities	107
2.8	Framework of 6 weeks of SSG training	108
3.1	Illustration of Study Design for Study 1	113
3.2	Graph Q-Q plot for age when they first started to play soccer	121
3.3	Graph Q-Q plot for age when they started to train (monitored By adults)	121
3.4	Graph Q-Q plot for age when they started to train regularly	122
3.5	Graph Q-Q plot for age when they started to compete at competitive level	123

3.6	Graph Q-Q plot for age when they started train regularly in order to improve performance	123
3.7	Statistical analysis (t-test) for age milestones	126
3.8	Hours accumulated in soccer-related activities	127
3.9	Post-hoc analysis with Bonferroni adjustment for Pairwise Comparison	130
4.1	Illustration of Study Design for Study 2	150
4.2	Graph Q-Q plot of training form activities for elite u-22 soccer players	158
4.3	Graph Q-Q plot of playing form activities for elite u-22 soccer players	159
4.4	Graph Q-Q plot of others activities for elite u-22 soccer players	159
4.5	Graph Q-Q plot of training form activities for university-based soccer players	160
4.6	Graph Q-Q plot of playing form activities for university-based Soccer players	161
4.7	Graph Q-Q plot of others activities for university-based soccer players	161
4.8	Descriptive statistics for microstructure of practice activities	162
4.9	Descriptive statistics of sub-activities for microstructure of practice	163
5.1	Illustration of Study Design for Study 3	170
5.2	Illustration on the SSG dimensions	176
5.3	Agility T-test layouts adopted from Semenick (1990)	179
5.4	LSPT Test layouts adopted from Le Moal et al., (2013)	183
5.5	Slalom Dribble Test layouts adopted from Stone and Oliver (2009)	184

5.6	Descriptive statistics within two different time for elite u-22 soccer players	195
5.7	Descriptive statistics within two different time for university-based soccer players	196
5.8	Post-hoc analysis with Bonferroni Pairwise Comparisons (within-subject pre and post)	198
5.9	Post-hoc analysis with Bonferroni Pairwise Comparisons (between subjects)	201

LIST OF ABBREVIATIONS

Abbreviation	Description
AFL	Australian Football League
ANOVA	analysis of variance
ASEAN	The Association of Southeast Asian Nations
AUG	ASEAN University Games
BMI	Body Mass Index
DMSP	Developmental Model of Sport Participation
FAM	Football Association Malaysia
FIFA	Federation International Football Association
FISU	International University Sports Federation
GK	goalkeeper
HIIT	high-intensity interval training
HIR	high-intensity running
ICC	Intraclass Correlation Coefficient
IOC	International Olympic Committee
IPT	Institution of Higher Education
kg	kilogram
kg/m^2	kilogram per square metre
km/h	kilometer per hour
LSG	large-sided games
LSPT	Loughborough Soccer Passing Test

m	meter
m^2	square meter
M	mean value
MANOVA	multivariate analysis of variance
MASUM	Majlis Sukan Universiti Malaysia
min	minute(s)
mL/kg/min	millilitres per minute per kilogram
MoE	Ministry of Education Malaysia
MoHE	Ministry of Higher Education Malaysia
MSG	medium-sided games
MSN	National Sports Council of Malaysia
MSSM	Malaysian School Sports Council
MUFA	Malaysian University Football Association
NSI	National Sports Institute
PAR Q	Physical Activity Readiness Questionnaire
PHQ	Participation History Questionnaire
PLD	”Pusat Latihan Daerah”
RPE	rate of perceived exertion
sec	second(s)
SD	standard deviation
SPSS	Statistical Package for Social Science
SSBJ	Bukit Jalil Sport School
SSG	Small-Sided Games

SSM	"Sekolah Sukan Malaysia"
SSN	"Sekolah Sukan Negeri"
SSTMI	Tengku Mahkota Ismail Sport School
SUKMA	Malaysia Games
TID	Talent Identification and Development
VO_2max	maximal oxygen consumption
vs	versus
WUC	World University Championship
WUG	Summer Universiade
YYIRTL1	Yo-Yo Intermittent Recovery Tests Level 1
YYIRTL2	Yo-Yo Intermittent Recovery Tests Level 2

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Soccer is the most popular, influential and attractive sport in the world and has been practiced at international level by every nation, without exceptions (Reilly & Duran, 2003). Its popularity may attract and gather masses of spectators at stadiums and viewers in front of televisions (Aguiar et al., 2012; Arifi et al., 2019; Barengo et al., 2014; Gardasevic et al., 2019; Kubayi et al., 2015; Qader et al., 2017). For instance, FIFA World Cup Russia 2018 was watched by 3.5 billion viewers which was almost half of the world's population up to 2.2% as compared to FIFA World Cup Brazil 2014 with 128 million followers across Federation International Football Association (FIFA) social media outlets while FIFA Women World Cup France 2019 attracted approximately 1.12 billion viewers worldwide and brought women's soccer further into

the mainstream (Federation International Football Association, 2018) that can reach very huge populations in the world. Soccer has been played by either males, females, adults or children at different levels of ability (Stølen et al., 2005). Worldwide, soccer is not only becoming a cultural phenomenon among the people of a community with the purpose of either leisure or entertainment (having fun), but has also tremendously become more attractive towards a professional career especially among new talents where for some were due to its extraordinary financial rewards (external motivation) (Reilly, Bangsbo, et al., 2000). New talents refers to new players (basically youth athlete), who are recognized to have potential in specific sports area that have been promoted into senior squad. In addition, study by Helsen et al., (2000) defined new talent as a young potential athlete who outperforms their own mates during either on training session or competition match-play and directly is also having a greater opportunity to reach as an elite performer. Additionally, a previous study by O'Connor et al., (2016) described the way in identifying talented soccer players by directly depending on the ability, capability and coaching skills of the coaches and talent scouting team in order to predict and identify the future sporting talent based on many criteria especially on athlete's current performance. Therefore, throughout their sporting careers, athletes have gone through different stages and phases in the developmental pathway towards expertise (Bloom, 1985; Côté, 1999; Stambulova, 2000) including soccer.

According to Reilly and Dust (2005), there are four key stages in the pathway towards excellence that are detection, identification, selection and development. Talent detection refers to the discovery of potential performers who are at present not involved

in the sport (Mohamed et al., 2009). However, since soccer has become the most popular sport in the world, participation in this sport might not be a problem in detecting the potential players especially among the children as compared to other sports. Further, a study by Williams and Reilly (2000) previously defined talent identification as a process of recognising current participants with the potential to become elite players. For talent selection, it involves predictions about which athletes have the best potential for future success which includes the analysis of current experts to determine which pattern of skills will be necessary for future elite performance whereas talent development aims at providing the most appropriate learning environment to realise this potential (Reilly, Bangsbo, et al., 2000). Overall, talent identification programs are allied with the subjective evaluation on the players' potential by the coaches and scouting team that evaluate and select the potential players based on the criteria that primarily rely on the personal taste, current knowledge and past experience (Christensen, 2009; Meylan et al., 2010). Previously, coaches and the coaching staff within a sport typically have gone through the talent detection and identification process, and due to that, their ability to identify the talented individuals and potential athletes should never be underrated because it is a very subjective process (Williams & Reilly, 2000) that might be either equality, bias or equity. Therefore, to identify the new talent, the process of recognising current sports performers with the potential to become elite players is well-known as talent identification (Alayode et al., 2014; Williams & Reilly, 2000). Meanwhile, talent detection is finding talented players who demonstrate outstanding performance in sport-specific abilities that are predictive of future career success (Lidor et al., 2009; Reilly, Williams, et al., 2000). The program in talent identification might include assessing the characteristics that are related to excellence,

which include anthropometric characteristics (such as height, weight and body fat percentage), fitness components (such as cardiovascular endurance, speed and agility), motor coordination (such as balancing and jumping), perceptual-cognitive skill (including anticipation, decision-making and game intelligence), sport-specific skill (including dribbling in soccer, serving in tennis and shooting in handball) and psychological traits (including goal motivation, anxiety attention style and imagery) (Williams & Reilly, 2000). The awareness among soccer clubs and associations regarding ~~of~~ the importance of identifying talented youth soccer players at early ages has increased and have incorporated them into academies or youth teams. However, there is a general perception that soccer has been seen from two different angles which can increase professionalization of young players while giving the disadvantages towards player's development (Relvas et al., 2010; Roderick, 2006). This has been agreed upon when about only less than 1% of soccer players from the Premier League soccer academy who were able to make their debut at professional level but surprisingly they are no longer in the squad when they reach the age of 21 years old and this does not only happen in England, but also occurs in the other two most popular leagues in Europe which are German Bundesliga and Spanish La Liga (Lea, 2018). In addition, the same situation happened in Malaysian national team squad where approximately only 13% of u-22 players, from a total of around 476 players, who manage to penetrate and represent the senior squad in either for friendly matches, Asian Cup Qualifiers or World Cup Qualifiers in the duration between 2015 until 2020 (Football Association Malaysia, 2020; TransferMarkt.com, 2020). Meanwhile, the next stage is talent development which aims to provide the most appropriate learning environment to realise this potential (Reilly, Bangsbo, et al., 2000) while (Gagné, 2011) referred to

talent development as the progressive transformation of outstanding knowledge and skill in a specific field. Talent development has been described as a complex, non-linear and dynamic process with the variation attributes towards success (Collins & MacNamara, 2012; Williams & Reilly, 2000). In addition, Dai and Speerschneider (2012) stated that, it is the process involving prolonged both formal and informal learning in either single or multiple domains, with highly committed efforts, deliberate practice and extended problem solving and self-improvement that results in a unique set of specialized knowledge, skill and descriptions. Due to that, it presents multiple number of challenges to not only for team sports coach but also for individual trainers specifically during day-to-day variations and progressions in skill and also physical and cognitive maturation which require a regular monitoring towards valid performance appraisal. In combination, talent identification and development (TID) is a well-known program that has commonly been used in order to recognize them and has become a 'hot topic' for researchers and practitioners (Pain & Harwood, 2012). TID can be described as a process of selecting or recognizing the best individual with the potential in their respective sports areas to become elite players and due to that this has become the main process in all countries (Boostani et al., 2011). TID among young soccer players has increased tremendously over the last 25 years period among elite soccer clubs (Jones & Drust, 2007) and also national associations in European country such as Belgium, Germany, Netherlands and Portugal who have developed and created the TID programs in order to serve, provide and produce the best training environment and conditions towards developing young potential players where currently the enrolment in these programs frequently starts during early-adolescence (Huijgen et al., 2013; Leyhr et al., 2018). Conversely, other clubs may strive to adopt a more ''creative'' style

of play with greater emphasis on skill and technique. In Netherland League, famed for its production line of young talent, encourages coaches to use the acronym TIPS (technique, intelligence, personality and speed) within their talent identification practices (Brown, 2001). Other than that, the other acronyms such as TABS (technique, attitude, balance and speed) and SUBS (speed, understanding, personality, skill) have been used by coaches in England (Stratton et al., 2004) to assist intuitive judgements with scientific rationale.

In recent years, youth tournaments have been the best platform and medium in order to determine and identify the potential of rising stars. According to FIFA.com, The FIFA Coaching and Player Development Department was responsible for the activities of the Technical Study Group which identified the most talented players during tournaments in FIFA u-20 World Cup 2019 based on their current performance (Federation International Football Association, 2020). Talent identification has multiple programs which had been done across the country and continents. Elite youth soccer players in Australia were selected based on four critical components including the players' current match-play performance, their region, number of other sports participation and combination of perceptual–cognitive performance and the result had shown the differences between the selected and non-selected elite youth soccer players programmes (O'Connor et al., 2016). In line with that, there were previous findings that make a significant contribution to the current knowledge by providing an initial evidence of the hierarchy of attributes among Australian youth athletes that had been considered as important when identifying and selecting under-13 players to represent a team by considering their technical ability, tactical, psychological skills (Larkin &

O'Connor, 2017) and also physiological aspects (Dodd & Newans, 2018) which become the most important criteria within the talent identification process. Apart from that, in European country, such as United Kingdom, as part of the Elite Player Performance Plan (EPPP) for soccer players, all teams that play in English Premier League along with first category of soccer academy had conducted a standardized series of fitness tests on a tri-annual basis with the purpose to identify the potential of youth talent in soccer which focuses on four main fundamental criteria that are improving coaching provision, effective measurement, significant gains in player development and player education (Premier League, 2022). Due to the variety of criteria, in order to produce a quality result that should be possessed by a young athlete before becoming an elite performer, it is very difficult and complicated and probably impossible for the scouting team to recognize the talent based on a single or rough observation by one man during a single testing/identification event. Therefore, it has become an important criterion for each responsible/appointed/selected individual/sport organization to design, develop and use their own talent identification program and at the mean time can link it with the athlete development and education systems where they should act together as one integrated body.

In addition, according to (P. K. Miller et al., 2015), the talented players can be selected, either as the first team player or later as an option, can be sold for their career development. Thus, it directly becomes as the main objective for both professional soccer clubs and national governing bodies to develop youth players and later can be transformed into professional players as the benefits will be earned in the long run (The FA, 2022). However, this is not only a challenge for the academic setting itself but also

to all parties who are supposed to play a major role in identifying the best potential youth talents while guiding and assisting them to reach their maximum potential. There were several studies that had been done in Malaysia on the developmental of elite athletes. Previous study by Leong et al., (2020) showed that Malaysian elite u-17 tennis players tend to follow early specialization pathway where they had started early and focus more on structured activities. In addition, a study by Tan et al., (2019) showed that Malaysian student athletes at National Sports School were commencing in their main sport later for individual sport athletes, but progressed to international competitions earlier, and went on to higher levels of competitions when compared to the team sport athletes. Other than that, Low et al., (2017) had done a study on Malaysian u-21 badminton players (national youth and state) and found that they had also followed an early specialization pathway. Lastly, Malaysian elite u-18 swimmers (elite and sub-elite) have a similar developmental pathway at the early stage of their career but differ significantly when moving towards their adolescent years (Tan & Low, 2014).

In Malaysia, talent identification and development programs had started almost more than two decades ago and had begun prior the hosting of the 16th Commonwealth Games in Kuala Lumpur in 1998 (Ibrahim, 2009). Talent identification and development programs were previously testing the young athletes (Moreland, 1994) and also non-athletes in order to identify the latent sports talent through mass screening test (Majlis Sukan Negara, 1998). The test and measurement including the anthropometric characteristics measurement (such as arm span, body mass (weight), height, sitting height and skinfold measurements) and fitness components testing (such

as 40-m sprint test, agility hexagon test, endurance shuttle run (or 800m run), vertical jump and weight throw) (Ibrahim, 2009). However, the weakness of those programs was that all the concepts were not being documented except for their test procedures and normative data. Then, the TID program is only being continued among athletes via mass screening. Currently the TID process in Malaysia includes; (1) talent detection via General TID Program, (2) talent selection via MSSM tournament, and (3) talent perfection via core sports (Mahadi & Singh, 2007). To date, the Ministry of Youth and Sports, National Sports Council and National Sports Institute along with the Ministry of Education are continuing to work together in executing this talent identification and development program which aims for excellent sports performances at international level and due to that, all related parties, such as teachers, coaches and also trainers, can make use of this program in order to achieve excellent sports performances at any scales either at inter-school, inter-district, inter-state levels or at even higher level at international sports competitions (Soeed, 2016). Apart from that, Football Association Malaysia (FAM) had planned to reintroduce again the FAM First-Touch Program for grassroot development as an additional with the existing youth soccer academies such as the National Football Development Program (NFDP) as well as soccer academies that got accreditation by FAM at the entire country where these academy were competing at both national and international soccer tournaments at multiple age level (FAM, 2018; Karim & Razak, 2018). In addition, there were also have a development of soccer competition among institution at higher education level which known as IPT League (or Institution of Higher Education League). IPT League begin at 2010 and has been expanded year by year until it become to 4th tier division. Currently, the teams had compete in 3 divisions including Division One, Division Two and qualification zone

(Arena IPT, 2022). As consequences of IPT League, the earliest universities team such as UiTM FC, USM FC and UKM FC exist to compete at Malaysian Super League and Premier League while currently, Malaysia University Football Association (MUFA) team is competiting at M3 League (OneNews, 2021; Sudarji, 2022; Syamim, 2019). Other than that, the players were not only compete at national level, but also at international level including ASEAN University Games (AUG), Asian University Championship, World University Championship (WUC), Summer Universiade (WUG) and also International University Sports Federation (FISU) University World Cup Football which directly showed the inter-university soccer tournament is one of the high-class tournaments that had been organized (Majlis Sukan Universiti Malaysia, 2022).

Research, after all have led to the growth of the number of models for athlete development towards expertise that integrate the concepts between deliberate practice and deliberate play. Apart from that, the pathway of both early specialization and diversification have been integrated with environment in which the processes are happening (such as role of coaches, peers/mates and parents). From the large number of youths who participate in sport around the world, only a small fraction manage to sustain then penetrate to become elite athletes (Danish et al., 2005). Elite athletes have been developed in several pathways before they achieve expert performance. One of the models that have been developed in order to determine the pathway of an elite athlete is the Developmental Model of Sport Participation (DMSP). Based on the DMSP, the elements in developing an athlete towards becoming an elite performer are the activities and the pathway that they engaged in during their childhood period namely

early specialization and diversification pathways (Côté et al., 2007; Côté & Vierimaa, 2014; Ford et al., 2016). In addition, Hendry and Hodges (2019) posited that in developing elite performers, soccer players engage in the sport pathway (either early specialization or early diversification), participate in a variety of sports, but with the majority of their time had been spent on soccer-specific practice and they had played since an early-age. Towards expert performance, a review from previous studies (Ahmad et al., 2020; Coutinho et al., 2016; Hendry & Hodges, 2019) indicated that early specialization is not the only pathway to reach expertise but it comes along with its counterpart that is early diversification (which contradicts early specialization) that can also lead to elite performance and can provide important benefits for their continuation in sport participation and individual personal development.

A review by Ahmad et al., (2020) concluded that both pathways manage to develope the expertise, but some previous studies still continue to debate on which pathway is the most beneficial for the attainment towards sport expertise and relates to the positive youth development (Côté & Jennifer, 2012; Ford & Williams, 2013). Figure 1.1 shows that individuals will enter a sport as early as the age of 6 in both pathways. For early specialization, the athletes will involve in high amount of deliberate practice, low amount of deliberate play and focus on one sport participation. However, after achieving elite performance, athletes tend to reduce in physical health and enjoyment. Previous study defined this pathway as a year-round training (more than 8 months per year), choosing a single main sport by quitting all the other sports to focus on one sport (Côté & Vierimaa, 2014; Jayanthi et al., 2015; McFadden et al., 2016; Myer et al., 2015) and engaging in high amounts of deliberate practice in a single sport (Côté & Vierimaa,

2014; McFadden et al., 2016). Other than that, early specialization also refers to an early age engagement in primary sport (usually starts at 5/6 - 12 years old) (Baker et al., 2009; Baker, Côté, et al., 2003; Baker, Côté, et al., 2003; Côté & Jennifer, 2012; Côté et al., 2007; Ericsson et al., 1993; McFadden et al., 2016). This is necessary towards the acquisition of sports skills that are required for competitive success in many sports (Brenner et al., 2016). According to a review by Normand et al., (2017), sport specialization might be appropriate in unique situations but only after the existing of the development of specific skills, abilities, and psychological maturity. Additionally, early specialization and deliberate practice in one sport from an early-age based on ideas that originated from the deliberate practice framework and the assumption that a relationship exists between the deliberate practice activities and engagement with the primary intent of improvement and performance (K. A. Ericsson et al., 1993). Deliberate practice was proposed by Ericsson et al., (1993) and is known as the common theory to be referred upon the development of expertise. Again, Ericsson et al., (1993) defined it as the engagement and participation in a practice activity which had been designed in order to improve on a particular aspect of performance through immediate accurate feedback, opportunities for gradual refinement with repetition after reflection and problem solving which also requires the combination of cognitive and physical effort but relatively low in fun and enjoyment. Other than that, deliberate practice had also been defined as a highly structured practice activity with the purposed of improving sports performance which requires concentration, feedback and is not inherently enjoyable while it had also been designed to constantly improve performance beyond a plateau by causing positive activities adaptation to the performers and the underlying mechanisms of their performance (K. A. Ericsson et al., 2005). In addition,

early investment in deliberate practice which is referred as highly structured and intensive activities with the explicit goal to improve performance (Baker et al., 2009; Baker, Côté, et al., 2003; Baker, Côté, et al., 2003; Côté et al., 2007; Côté & Jennifer, 2012; Ericsson et al., 1993) and early involvement in competition match-play in their respective sport (Côté et al., 2007). Studies on different types of sport either on individual (such as badminton by Low et al., (2017) or team sports (such as volleyball by Coutinho, Mesquita, Davids, et al., 2016) have reinforced the conclusion that the time spent on high quality deliberate training has become a powerful predictor of attainment. In addition, deliberate practice had been referred to the involvement in structured training such as hours in competition and coach-led practice (Côté et al., 2007; Low et al., 2017). The theory of 10,000 hours of deliberate practice had been introduced by Ericsson et al., (1993). This theory mentions that to achieve expertise level, an individual needs 10,000 hours (which equals to 20 hours a week, 50 weeks a year in 10 years) and has to invest that time wisely, by engaging in deliberate practice as previous studies (Ericsson et al., 1993; Ferguson & Stern, 2014) had stated that leading its way into 'the sports training world with the belief that early acquisition of training hours' at a young age will lead to greater success. Furthermore, scientific research concluded that it takes around 8 – 12 years of deliberate practices for a young athlete to reach elite levels which can translate slightly to more than 3 hours per day and is commonly known as 10 years or 10,000 hours rule for an elite performers to accumulate more hours compared to a non-elite performer (Rees et al., 2016; Williams et al., 2011) in excess of 10,000 hours of training in darts (Duffy et al., 2004), gymnastic (Law et al., 2007) and athletic coaching (B. W. Young et al., 2009).

On the other hand, early diversification pathway differs from early specialization as through this pathway, athletes will undergo three phases of years that are sampling years (6 - 12 years old), specializing years (13 - 15 years old) and investment years (above 16 years old) before reaching elite performance. During sampling years, athlete will engage in high amount of deliberate play, low amount in deliberate practice and play activities with a variety of sports participation during their childhood period. Next, as their age increase, moving into the specializing years, athlete's engagement in deliberate play and practice is equal while they have a decrement in terms of number of other sports participations. Lastly, during investment years, this becomes a turning point when athletes will start to engage more in deliberate practice, participate less in deliberate play and divert by focusing on only single sport training before reaching elite performance. However, at early diversification pathway, after attaining elite performance, athletes will gain the enjoyment and have an enjoyment towards the sports. In other point of view, deliberate play also an important element in determining the pathway towards elite performance. Due to that, the intensity of the training session and early specialization in most sports should be delayed for at least until late adolescence with the purpose of reducing the risk of injury and adverse the psychological stress and, thereby, the athlete's sport career is recommended to be organized with less training hours at early age and specialization later that seems to be more beneficial for young athletes in sports and athletics (Latorre-Román et al., 2018) which can provides for a greater chance of lifetime sports involvement by reducing drop-out rate, lifetime physical fitness acquisition and possibly elite participation (Brenner et al., 2016). In addition, as the key to reach the super-elite level, Rees et al., (2016) recommended an involvement in diverse sports

during childhood and engage with the appreciable amounts of sport-specific practice/training in late adolescence and adulthood while Huxley et al., (2017) highlighted that it might lead to longevity of elite sporting careers. Previous studies (Côté et al., 2003; Memmert et al., 2010) also mentioned that the amount of engagement in deliberate practice for children and youth is recommended to be minimal (less hours) with the purpose of a greater emphasis on sport-specific play activities that are inherently fun, enjoyable, less stress and intrinsically motivating. Furthermore, previous study by J. T. Berry and Abernethy (2003) focused on the early-engagement activities of Australian Rules football players by comparing between expert and non-expert decision makers, and the results indicated that the expert decision makers involved in a greater amount of time in deliberate play activities and less in structured practice activities compared to non-expert decision makers. Previously, Coȏté and his colleagues (Côté & Hay, 2002; Côté et al., 2003) identified any fun and enjoyable activities that contributed to the development of expert performance in sport can be known as deliberate play. These activities, engaged significantly during childhood (early-age participation) and with the purpose of having fun and enjoyment as with the adapted rules from the actual sports such as playing at small-sided field. In addition, deliberate play, referred as unstructured early developmental activities, which are intrinsically motivating, provides immediate satisfaction and is specifically designed to maximize the enjoyment as mush as possible (Côté & Jennifer, 2012; Côté & Vierimaa, 2014; Côté et al., 2003; Côté et al., 2003; Côté et al., 2007; Côté et al., 2013; Lidor et al., 2009) child-centered coaches and parents, being around by peers who are involved in sport, appear to be essential characteristics of environments for young children that encourage their later investment in structured practice activities (Côté & Vierimaa,

2014) and participate in a variety of sports during early age (Gallant et al., 2017; Hendry & Hodges, 2018) before focusing on a single sport after 12 years old (McFadden et al., 2016). Furthermore, deliberate play is an involvement in unstructured training (such as hours in peers-led practice and individual practice) (Côté et al., 2007; Low et al., 2017). Indeed, other athlete development models worldwide have emphasized the importance of early sampling and/or the development of physical literacy or fundamental movement skills (Gulbin et al., 2013). Table 1.1 shows the difference between deliberate practice and deliberate play based on (Côté et al., 2007).

Table 1.1.

Elements of Deliberate Practice and Play

Deliberate Practice	Deliberate Play
Have future goal to achieve	No goal (use for own sake)
Less fun and enjoyable	Fun and enjoyable
Carried out seriously	Pretend quality
Interest on outcome of the behaviour	Interest on the behaviour
Explicit rules	Flexible
Required adult involvement	Not required adult involvement
Occurs in specialized facilities	Occurs in various settings

Adapted from Côté et al. (2007)

The engagement in training is an important factor for skill acquisition and the development of expert performance (training hours), therefore, a specific and well-planned practice, training, competition and recovery regime will ensure optimum

development throughout an athlete's career. According to Ford and Williams (2012), the study on professional soccer players in England showed that players were following the early engagement pathway throughout their childhood as they engaged more hours in soccer specific practice and play activity compared to those who were unable to continue their career into professional status during adulthood. In line with that, Ford et al., (2012) also found similar finding where soccer players showed some relatively minor differences between countries, but generally the developmental activities of the players followed a mixture of the early engagement and specialisation pathways rather than early diversification. In addition, there were several studies which had been done in determining the elite performers' pathway in Malaysia. Currently, Leong et al., (2020) investigated the developmental pathway of Malaysian tennis player while Tan et al., (2019) had investigated the developmental pathways of athletes from two different types of sports (individual and team sport) from two Malaysian national sports schools. In addition, study by Low et al., (2017) examined the developmental factors of the Malaysian elite youth badminton players and with the same sport, Ford et al., (2016) examined the amount and types of activities engaged in by the elite badminton players in European and Malaysia. Lastly, there was a previous study by Tan and Low (2014) that intended to investigate the developmental pathways of the Malaysian swimmers. However, there was still lack of data that investigate the developmental pathway of the elite soccer players in Malaysia. Therefore, this study intends to investigate the developmental pathway of elite soccer players and compare it to non-elite soccer players. As the amount of practice had influenced the pathway to becoming elite performers, this study continues to investigate the microstructure of practice activities of the soccer players. This study predicted that, the players spend more time

on deliberate practice, and therefore, the next study will ~~be~~ investigate the types of practice with the existence of coaches. Further examination into the microstructure of soccer-related practice session could further validate the types of activities that contribute to the attainment of elite performance.

The development of player development in sport especially soccer is a very complicated process (Williams & Reilly, 2000) and one of the most influential factors for an individual to achieve elite performance is coaches (Cushion, 2013; Stoszkowski & Collins, 2016). Coaches' practice tends to be very unique as the "skills" are to be mastered first and forms the basis for games play (Harvey et al., 2010). In addition, coaches of youth athletes might play a crucial role in determining whether sport systems provide opportunities for peak athlete performance both promoting lifelong participation and shaping personal development. As being agreed previously by Horn (2008) who highlighted that the youth athletes basically will place their trust on adults in order to guide and provide them with practice activities that will lead to positive outcomes while in this context, the adults is referring to coaches – one of the primary influences on athletes' experiences in sport as they can facilitate positive developmental experiences that is of utmost importance. The engagement in practice session acts as an important factor towards skill acquisition and the development of expert performers and this inspires athletes to work hard in practice throughout their entire careers. Due to that, previous studies (a review by Balyi & Hamilton, 2004; Bloom, 1985; Ericsson & Charness, 1994; Ericsson et al., 1993; Salmela et al., 2000) recommended young athletes to accumulate 10,000 hours of practice (or 10 years rule) throughout their entire career before achieving elite level. As being mentioned multiple times, the engagement

in training will continuously bring a positive outcome as practice makes perfect. Thus, it might play an important role for skill acquisition and greater performance compared to their peers and mates. Due to that, designing a proper training program becomes one of the crucial phases for coaches as it needs knowledge and a set of experience in order to tolerate variety of elements such as positional roles (A. Dellal et al., 2012), team's context and their objectives, level of players (F. Clemente et al., 2012), players' condition, environment, current performance and other-related factors which need to be considered in order to ensure the effectiveness of the training towards players' adaptation and better performance. Therefore, the creativity of coaches and the coaching team becomes a crucial elements to be considered. As reported by previous studies (Manzi et al., 2010; Mujika et al., 2004) which mentioned that training is a process of adaptation from specific stimulus where enhancements in the performance are achieved through progressive manipulation of the training volume including load and duration. Having said that, training will work differently towards different individuals based on their specific ability such as genetic and muscle fibre type and player's adaptation (Bouchard et al., 1997). Frequent engagement in training is an important factor as it is expected to be able to develop skill acquisition and is directly towards expert performance. To achieve this, the role of youth soccer coaches and the coaching team is important in developing sports talent (Ford et al., 2010; Côté & Gilbert, 2009) by guiding and helping young players to develop and sharpen their skills which may be beneficial towards the increment and success of their performance (Ford, Low, et al., 2010). The behaviours, elements and activities that they can use in order to form the teaching and learning environment (Ford, Low, et al., 2010; Partington & Cushion, 2013) might become the main factors towards developing player's technical

skill and tactical requirement (C. J. Cushion & Jones, 2001; Woodman, 1993). In fact, previous study done by Broadbent et al., (2015) agreed that the primary consideration when designing the training program is the retention and the ability to transfer the learning skills from that particular activities towards the real-world performance. Even though their influences will differ between the level of sports, the talent development (J. H. Salmela & Moraes, 1996) and the individuals, the guidance and coaching from them is beneficial to develop successful athletes (Koh et al., 2011) and can also lead towards the improvement of individuals as well as team performance in competitive contexts (Humberto Almeida et al., 2012). Therefore, a transition including shifting from playful activities into coach-led practice is needed during the specialisation years in order to create more successful professionals (Ford et al., 2012; Ford et al., 2008). This clear shifting and transformation in soccer involvement and type of training methods should be reflected in the approach to develop player's development.

Generally, coaches will design a training program after considering several factors such as team objective, player's ability, current team condition and other reliables elements depending on the coaches' creativity including knowledge, understanding, experience and interest which could make the training program become more unique as it differs among coaches. In other point of view, the maximum and positive benefits can be achieved when the training stimulus are a mimic towards competitive match-play demands in high performance sports (Bompa & Buzzichelli, 2018; Bompa & Haff, 2009; Bompa, 1983). The microstructure of practice activities that the players engage in with the presence of coaches can be divided into two main generic types that are the Training Form and the Playing Form with the addition of

others. However, previous study defined differently on each sub-activity depending on the sports and the activities that they were interested in. Nevertheless, the previous studies had used the same categorising model (with a slight modification) and did not clearly describe how the model should be used to optimise skill development and due to that, the skill development still remains unclear. Previous studies defined training form as an activity in the training session that has an expected results or isolated skill component (O'Connor et al., 2018), a practise in small groups which is related to individual session practice and devoid of competition-like context (C. Cushion et al., 2012; Ford, Yates, et al., 2010; Hall et al., 2016; J. Low et al., 2013; Partington & Cushion, 2013), focusing on the development of the player's skills via drills and isolation activities that have been performed in no or less pressured environment (Ford, Low, et al., 2010; Partington & Cushion, 2013; Partington et al., 2014) and as activities that have been considered to be less relevant and important towards the preparation for competition (Ford, Yates, et al., 2010; Starkes, 2000). In addition, study by Partington, (2012) mentioned that the coaches' cognitive factors might be beneficial for more training form activities as it is based on the view and perception that the basic skills ~~is~~ are compulsory to be divided into smaller constituent parts first during acquisition before proceeding towards practicing the skills together as a whole. This method can be known as part-part-whole. In contrast, O'Connor et al., (2018) defined playing form as activities during the training session that emphasis on the activities that can replicate the match or game play such as small-sided activities and larger activities. In addition, J. Low et al., (2013) defined playing form as activities which have a similar structure with the competition such as small-sided games (SSG), match play and match play conditioned. In line with that, playing form activities might replicate the activities

which are able to meet the nature of game-based such as SSG, conditioned games and phase of play (C. Cushion et al., 2012; Ford, Yates, et al., 2010; Hall et al., 2016; Partington & Cushion, 2013). Other than that, previous studies (Ford, Yates, et al., 2010; Williams & Ford, 2008) mentioned that the playing form activities such as technical session, tactical training and physical aspects of match-play can directly promote the development of technical and perceptual-cognitive skills of the players so as to meet the demands towards competitive sport. Then, the maximum benefits and advantages are obtained when the stimulus that have been given during the training session are in line with the demands in the soccer match-play competition as the activities are related to playing form activities (Mallo & Navarro, 2008; Turner & Stewart, 2014) and might facilitate superior transfer in some components including perceptual, cognitive and motor skills performance in competition rather than activities from training form (Ford, Yates, et al., 2010; J. Low et al., 2013; Partington & Cushion, 2013; Williams & Ford, 2008). Particularly in sports especially soccer, the playing form activities are the activities that have been defined to be the most relevant components towards skill acquisition and performance based compared to the other types of activities that are less relevant towards physical training and the isolated practice of technical skills (Ford, Yates, et al., 2010; Williams & Hodges, 2005). In addition, the types of training that are required might generally mimic to meet the demands of competitive match-play as well as becoming a consideration for designing a training program as previous studies (Hall et al., 2016; O'Connor et al., 2018) found that playing form was found to be dominant compared to others. As concurred by previous studies (Ford, Yates, et al., 2010; J. Low et al., 2013; Partington & Cushion, 2013) which found that, players had engaged more time in activities that were considered less relevant to

soccer match-play performance than activities that were considered to be more relevant towards soccer performance. Other than that, study by J. Low et al., (2013) that examined the types of practice activities in youth cricket players during coaching sessions found that players had spent more time on training form activities (69%), followed by playing form (19%) and others (12%) when the data were obtained during competition season. In line with that, previous study by Partington and Cushion (2013) also found similar finding as they investigated the coaching behaviours of the elite English youth soccer coaches in different practice settings and gained insight into the coaches' cognitive processes underpinning these behaviours with training form being more dominant compared to playing form, but the collection of the data was during the mid-season. In contrast, particularly in soccer, the playing form activities seem to be more relevant to skill acquisition and performance than other types of activities involving physical training and the isolated practice of technical skills (Williams & Hodges, 2005; Ford, Low, et al., 2010). Other than that, youth soccer players perform several divert activities from specific to general activities which require certain technical skills abilities (F. M. Clemente et al., 2016) and physical readiness in order to cope and match with the demands of the game-play (Trecroci et al., 2020). Previous study by Fuhre and Sæther (2020) indicated that both soccer clubs which played at different playing levels (professional and non-professional u-16 soccer team) spent more time on playing form activities rather than on training form activities which directly showed no discrimination between playing level. In addition, O'Connor et al., (2018) who had studied on the changes of the type and duration of coach behaviours over the course of the session among youth soccer players found similar findings where youth soccer players had engaged more time on playing form, followed by training form

and inactivity. However, both previous studies did not report when they had done their study.

The debate stills continues towards the types of activities that are commonly been used by coaches during training session among elite performers. However, there is still unclear data on the best types of training that have been done since it can be discriminated due to phases, playing levels or competition demands. Previous study by Fuhre and Sæther (2020) who compared two u-16 teams, in a professional and a non-professional showed that both clubs spend more time on playing form than on training form activity. Apart from that, J. Low et al., (2013) who examined the different between elite and recreational youth cricket players at different multiple age level showed that the practice activities of youth cricket players during coaching sessions in England contained greater amounts of engagement in training form compared to playing form activity. Moreover, previous study had been done on soccer players by O'Connor et al., (2018) who had identified that sub-activities in training form might include individual, paired and drills while in playing form involved small-sided activities and larger activities. In addition, two previous studies (Ford, Yates, et al., 2010; Partington & Cushion, 2013) had similarly categorized sub-activities in training form as fitness, technical and skills while playing form activities as SSG, phase of play and conditioned games. Additionally, there were other activities included that are inactivity (such as freeze in position, player huddle, drink break and transition) (O'Connor et al., 2017) and transition (J. Low et al., 2013). Therefore, this study intends to identify the microstructure of practice activities among youth soccer players during 8 weeks training session that are led by coaches and later compared it with non-elite soccer

players. However, this study predicts that players will spend more time in playing form activities. In order to develop competent athletes, the specific constraints imposed by the practice environment need to adequately replicate competition conditions in order to increase transfer of skill acquisition. One method for coaches is to manipulate the constraints of practice in order for this transfer to occur by using active decision-making activities (or playing form activities, Ford, Low, et al., 2010) such as manipulating the rules of SSG. In addition, in order to reproduce the physical and technical requirements of real match play (Hoff et al., 2002; MacLaren et al., 1988; Miles et al., 1993; Reilly & White, 2005) coaches often use SSG in their training programs.

Soccer is a team sport that is played on a pitch (grass) which is approximately between 100 x 60 m to 120 x 90 m pitch area with a ball that is being controlled using the feet frequently (sometimes being controlled using the other body parts except hands) and having some interactions within the teammates, opponents and sometimes with the referee which contribute to the different roles in the game (a review by Aguiar et al., 2012). Performance in soccer depends upon a numerous factors including physiological characteristics, technical or biomechanical components, tactical elements and mental aspect. During a 90 minutes of soccer match-play (sometimes might be up to 120 minutes due to extra time), elite players are expected to cover the distance around 10 km at an average intensity which is nearly to the anaerobic threshold (80 – 90% of maximal heart rate) (Stølen et al., 2005). In fact, soccer has been considered as a multifaceted sport where it requires skills and movement that need to be performed in a rapidly changing conditions or environments (Williams & Reilly, 2000), combination of multiple basic skills that could be performed at one time (such as jump and head the

ball), under the fatiguing conditions (Ali, 2011a), stress condition and environment, undertaking a lot of explosive, fast and quick movements (Bradley et al., 2009; Cortis et al., 2013; Di Salvo et al., 2009) and involves continuously high-intensity running interspersed with periods of either at rest or low-intensity running (Little & Williams, 2007; Rampinini et al., 2007) that directly lead the soccer players to have an experience towards the increment in match-play physical demands in part due to the shorter duration between match recovery periods and high neuromuscular demands (Barnes et al., 2014; Bush et al., 2015; Reilly & Ekblom, 2005). Other than that, players also experience two conditions that are; (1) soccer-related movements with the ball including passing, kicking, dribbling, heading and shooting, and (2) without the ball movement such as accelerations, decelerations and changing of direction in response to the unpredictable environments conditioned such as by the ball, teammates, opponents (Cortis et al., 2013) and sometimes with the referee, goal post and the flag. Apart from that, players can also create an excitement for spectators when touching the ball by producing an outstanding decisional action during match play (Roca & Ford, 2021) including the step over a ball movement, 'rabona' kick or crossing, the Cruyff turn, goal celebrations, donkey kicks, dummies (Talbot, 2014), no look pass and outstanding goal scoring. As to improve all components simultenously, SSG becomes the suitable method to be implemented.

SSG application in soccer training can be considered to offer multiple practical advantages that have led to the increment of its popularity as a training modality in soccer at all different ages and levels of play. The primary benefits of SSG training, which can appear to replicate similar movement demands in actual match-play,

physiological intensity and technical requirements during competitive soccer match play (Gamble, 2004; Little, 2009; Owen, 2006) while at the meantime also requires players to make correct decisions under pressure and fatigue condition (T. J. Gabbett & Mulvey, 2008), SSG closely replicates the physical and technical match-play conditions for professionals and constitutes a useful training tool for the elite soccer coaches (A. Dellal, Hill-Haas, et al., 2011). It also replicates specific dynamics that occurs in an official match, mainly considering network relationships and the specific effort regimens (F. M. Clemente et al., 2014; Gabbett & Mulvey, 2008; Hill-Haas et al., 2011). Previous studies (Capranica et al., 2001; Casamichana & Castellano, 2010; Dellal, Jannault, et al., 2011; Hill-Haas et al., 2010; Jones & Drust, 2007; Katis & Kellis, 2009; Kelly & Drust, 2009) highlighted the advantages of using SSG to improve physical capacities and technical skills since the early ages of soccer practice. In Malaysia, the holistic approach for the development of youth soccer players involves aspects such as technical, tactical mental and physical components that can be done simultaneously and at the same time introducing the "Introduction to Grassroots Coaching Module" which enables coaches to obtain all the courses that have been organized to relate directly with SSG (Football Association Malaysia, 2018). In addition, Australia also mandated SSG competition as "no score is recorded" until the age of 12 years (My Football, 2009). This will enable opportunities for players to develop and generate "game sense" (Bishop, 2009) by having greater opportunities in exposing them towards skill execution within a game environment and condition, improving the number of participation through the increment of fun and enjoyment and reducing the focus on result-based tactics. Therefore, the manipulation of certain

variables in SSG is expected to have an effect on fitness components and technical skills of the players.

In a match, a soccer player changes direction in every 2 - 4 seconds (sec) (Verheijen, 2000) and makes 1200 - 1400 changes (Bangsbo, 1992) of direction during a game. In addition, the training that emphasises on agility will enable soccer players to perform both actions, such as moving faster and changing directions more quickly, while maintaining and controlling body movement (Sporis et al., 2010). Other than that, there were between 8 - 12% from the total distance covered which involved high intensity running or sprinting (Hunter et al., 2004; J. Miller, 1984; Mero & Komi, 1986; Schmidt & Wrisberg, 2008) where approximately sprinting actions occurred between 500 - 600 m (Stølen et al., 2005) in every 90 seconds (Strøyer et al., 2004) and lasted on average between 2 - 4 seconds (Bangsbo et al., 1991; Helgerud et al., 2001; Reilly, Bangsbo, et al., 2000; Stølen et al., 2005) while for youth males, a total distances during sprinting were varied and ranged among groups between 114 - 325 m with the average frequency between 7 - 61 sprints (Taylor et al., 2017). For cardiovascular endurance, the demands in soccer showed that during official games, elite soccer players complete between 9 - 14 km (Bradley et al., 2010; Dellal et al., 2010; Dellal, Hill-Haas, et al., 2011; Dodd & Newans, 2018; Manzi et al., 2014; Osgnach et al., 2010; Stølen et al., 2005) and youth soccer players covered between 2186 - 10,000 m (Manzi et al., 2014; Taylor et al., 2017) while teams that finished in the top positions had greater values of VO_2max than the last teams (Wisløff et al., 1998). From technical skills view, approximately 80% from soccer games involves ball transition between players which is giving and receiving of passes (Chapman et al., 2007) and is directly related to game

possession as it has been determined based on the number of passes (Barreira et al., 2016). Previous study by Barreira et al., (2016) who mentioned that passing becomes a crucial element in soccer skills as it is important in promoting a dynamic game with possession that can generate shots towards goal while also increasing the opportunity to score a goal. Other than that, another important skill is dribbling as it has been considered critical to the outcome of the game, with elite soccer players performing 150 – 250 brief intense actions during a game (Mohr et al., 2003). In addition, every soccer player must accomplish well because it is intertwined with many skills such as dribbling the ball to pass over the opponent (LaPrath, 2008) and can also assist in talent identification process (Zago et al., 2016).

There are varieties of training modes and methodology that have to be considered before applying them as their function is to bring the ability of young athletes especially soccer players up to meet the high competitive demands and one of the best methods that can be implemented is the opportunity for them to participate frequently in actual competitions that might enhance game fitness, experience and match maturity. Accordingly, there are multiple requests and demands of the modern soccer game that have provoked and at the same times encouraged coaches and coaching teams to search for a new approach of training methodology that might be beneficial in enhancing multiple components including physical capacities, technical abilities and tactical skills of the players simultaneously (Sgrò et al., 2018). Then, SSG becomes one of the training methodologies that mimic towards match-play which can improve those components simultaneously. Being supported by previous study that showed the advantages of using SSG as a training tool since it can improves agility

(Chaouachi et al., 2014), increases sprinting and high intensity running (HIR) (Chaouachi et al., 2014; Dellal et al., 2012; Spencer et al., 2005), results in a large increase in VO_2max in soccer players which is efficient as a high-intensity interval training (Gabbett, 2006; Köklü et al., 2015), increases more numbers of passing option (A. L. Owen et al., 2014) and significantly more dribbling within the SSG due to the less passing options that increases the need for players that force them to dribble past the nearest opponents while creating a space for teammates to move with the purpose to keep trying to maintain possession (A. L. Owen et al., 2014). As being mentioned earlier, it has been well described and justified that the maximum benefits of training are achieved when the stimulus of training are similar towards competitive demands in high performance sports (Bompa & Buzzichelli, 2018; Bompa & Haff, 2009; Bompa, 1983) as it produces greater physiological demands than training session (Joo et al., 2016). Then, it reflects on one of the principles of training that is the principle of specificity as it previously justifies the use of this type~~s~~ of drills in training session (Reilly et al., 2009), therefore, SSG training is expected and predicted to be more efficient, effective and suitable for the development of the particular set of physical characteristics that are required during matches as they involve variety of actual movement patterns that are frequently used in soccer games (Impellizzeri et al., 2006; Köklü et al., 2012) and at the same time, the players can experience and benefit from similar situations that they encounter during competitive matches (A. Owen et al., 2004). Apart from that, for competition at youth level, the competitive format needs to be adapted and modified in accordance to the characteristics and behaviours of those that are involved in the sport (refer to youth player) and consequently the rules are frequently modified to suit ~~to~~ the physical development of children and youngsters

(Tessitore et al., 2012) for the purpose of participation. Previous research indicated that in order to optimize the players' match-play performance, training sessions should induce similar physiological and technical demands to those encountered during competitions (A. Dellal, Hill-Haas, et al., 2011; D. P. Dellal, Chamari, et al., 2011). Other than that, the development of technical and perceptual-cognitive skills will be beneficial after exposing to playing form activity which also offers a way of simultaneously preparing the athletes for the current physiological demands of the competition (Hoffmann et al., 2014) which can be achieved through the use of SSG training.

Ideally, physiological characteristics have been seen as an important factors that can differentiate between elite and sub-elite young players, particularly for speed and cardiovascular endurance (Gonaus & Müller, 2012). Other study by A. Dellal, Hill-Haas, et al., (2011) had examined the difference between amateur and professional that showed amateur should favor the use of SSGs with at least 2 touches because of their lower technical abilities as compared to professional players. In addition, a review from previous studies stated that SSG can improve agility, speed (Bujalance-Moreno et al., 2019; Hammami et al., 2018), VO_2max (Bujalance-Moreno et al., 2019; F. Clemente et al., 2012; Hammami et al., 2018), passing and dribbling (Bujalance-Moreno et al., 2019; F. Clemente et al., 2012). To date, eventhough there were multiple studies that had showed the benefits of SSG intervention that can improve agility (Chaouachi et al., 2014), speed (A. Dellal et al., 2012; A. L. Owen et al., 2014; Casamichana et al., 2014; Chaouachi et al., 2014; Eniseler et al., 2017), VO_2max (Casamichana et al., 2014; Halouani et al., 2017; Impellizzeri et al., 2006; Köklü et al., 2015), passing (A. Dellal

et al., 2012; A. L. Owen et al., 2014; Eniseler et al., 2017; Joo et al., 2016) and dribbling (A. L. Owen et al., 2014) but there is still lack of scientific data that investigate the effectiveness of SSG training towards both fitness components (agility, speed and cardiovascular endurance) and technical abilities (dribbling and passing) simultaneously. Therefore, the introduction of SSG training represents one of the most common training drills used by both amateur and professional teams in order to improve fitness components and developing technical abilities (Hill-Haas et al., 2011b). Previously, the conventional training method that had been used for coaching young athletes is characterised as less relevant towards soccer fundamental skill since it was able to reduce the demands of the game for learners through multiple repetitions of a single skill with no opponents which was less beneficial in order to acquire motor skill (Ford & Williams, 2013; Renshaw et al., 2009). In addition, Morgans et al., (2014) recommended the application of SSG to the coaches and trainers as it creates the opportunity for the coaching team to maximise their contact time with the players, increasing the efficiency and proficiency of training and also subsequently might reduce the total training time because of their multifunctional nature in developing multiple components. Being supported by previous studies (A. Dellal et al., 2008; A. L. Owen et al., 2011) where they believed that this SSG training approach is particularly beneficial for those players especially for elite players who have limited training time as a result of intense fixture periods due to participation in multiple competitions. In addition, since elite players often have busy schedules, it directly makes the coaches struggle to integrate with different training parameters and coaches have a limited amount of time to work with their athletes during the preseason and especially, in-season (Özcan et al., 2018). Over the course of approximately 45 weeks season,

professional European soccer teams may play in excess than 60 competitive matches and thus at specific times of the year, certain players may play multiple matches within a single week (Carling et al., 2012; Lago-Peñas et al., 2011) depending on the coach's and team's strategy. Currently, in Malaysian Tier 1 competition, each team had 22 matches (home away format with 12 teams) that were held within 5 – 6 months in a year with 3 – 4 resting days between matches while for under 21 tournament, each team had 20 – 22 matches (two groups; A and B) where the matches were held approximately within 5 months a year with 3 - 9 days resting period between matches (Football Association Malaysia, 2020). To the researcher's knowledge, there still lacks of study that investigate the effect of SSG on fitness components and technical abilities simultaneously. Therefore, this study intends to investigate the effectiveness of SSG training on player's technical skills (passing and dribbling) and fitness components (cardiovascular endurance, agility and speed) after 6 weeks of training program for elite youth soccer players.

Therefore, the present study was designed to explore this research gap using three studies in order to determine the elite performers based on their developmental pathway, microstructure of soccer-related practice and SSG effectiveness towards fitness components and technical abilities. Therefore, this study intends to investigate the developmental pathway of elite youth soccer players through their soccer participation history that is based on soccer-related milestone (age), hours accumulated in structured and non-structured practice and also number of other sports participation. Research related to sports skill acquisition have underlined the critical role of training towards expertise (review from Williams & Ford, 2008) and numerous studies

attempted to identify the pathways of elite athletes in order to facilitate the development process including the descriptions of the developmental activities in which athletes engage such as soccer-related activities (reviewed by Ford et al., 2015). This study predicted that the elite players spend more time on structured activities. Further, this study proceeded to the second study which is to investigate in detail what are the structured activities, especially activities conducted under the guidance of a coach. Training has been recognised perhaps as the most influential factor in order to develop expertise in respective sports (Baker & Young, 2014; Haugaasen & Jordet, 2012). At this stage, it becomes the specific transition that transforms an athlete's status from elite youth to elite and is where training session, competition match-play and the pursuit of elite level performance become the major attentions for developing players (Mills et al., 2014). Then, practices activities were divided into two types that are Training Form and Playing Form. According to J. Low et al., (2013), the activities in Training Form mainly represent the drill-type activities, while Playing Form activities mainly replicate to mimic the games-based activities. Training Form activity is expected to generate lower opportunities to develop the perceptual, cognitive and motor skills that are required for successful performance in competition while in contrast, the greater opportunities can be obtained in Playing Form activities for successful performance and due to that, this study proceeded to determine the effect of SSG on fitness components and technical abilities of youth elite soccer players since SSG is considered as one of the components in Playing Form (Ford, Yates, et al., 2010; Partington & Cushion, 2013)

1.2 Problem Statement

The statistics from Table 1.2 shows the tournaments that had been participated and the achievement by the Malaysian youth team in major tournaments between 2010 until 2020. For Olympic Games and u-22/u-23 AFC Cup, all teams had gone through the qualifying round before participating in the actual tournament while for SEA Games, all teams could automatically participate in the tournament unless the team had been banned by the organizer or decided to withdraw from the tournament. Therefore, based on the statistics, the Malaysian youth soccer team had qualified with merit only once out of seven tournaments (14.3%) with a total participation of only 6 out of 12 tournaments (50%). In addition, the Malaysian youth team had participated 100% in SEA Games since the tournament has no qualifying round. There was no achievement in the Olympic Games since the team never qualified within that period while the highest achievement in u-22/u-23 AFC Cup was at the quarter final stage. For the highest achievement in SEA Games, the Malaysian youth team had once become the champion in 2011, which was 10 years ago and managed to qualify to the final in 2017, that too as a host. In summary, there were only 2 medals (22.2%) from 9 tournament's participations that led the team to bring a medal.

Table 1.2.

Statistics on participation and achievement of the Malaysian youth soccer team from 2010 – 2020

Tournament	Total tournaments	Participation	Achievement
Olympic Games	3 (2010, 2014, 2018)	Not qualified	No
U-22/U-23 AFC Cup	4 (2013, 2016, 2018, 2020)	1 (2018)	Quarter final
SEA Games	5 (2011, 2013, 2015, 2017, 2019)	5 (2011, 2013, 2015, 2017, 2019)	2011 (Gold), 2017 (Silver - as a host)

Source: Federation International Football Association (2018)

Successful performance in sports especially in soccer is believed to rely upon technical and tactical skills as well as the physiological capabilities of an individual (Bangsbo, 1998) that might lead to superior team performance. Due to that, many talented players need to be precisely identified and carefully developed in order to improve their performance where in soccer the results for team sports performance can be seen after long term training process that had been designed with the purpose to improve players' skills and directly reflect the team performance in order to face the complex and dynamic soccer competition requirements. To identify talent, many TID programs have been developed by the country depending on its ability and environment

to meet the current soccer demand which had led FAM to plan and to reintroduce the soccer development program namely "First Touch". By having a good planning program, talented players can be developed as they can display better and superior performance in a wide range of activities (soccer-related activities), such as superior athletic performance as well as mental abilities (Feltovich et al., 2006). In addition, the DMSP had shown two different pathways towards achieving elite performance that are early specialization and early diversification where it can be determined through age milestones, sport-related activities and number of other sports participation (Côté & Vierimaa, 2014; Côté et al., 2007; Côté, 1999; Hodges & Williams, 2012).

Previously, there were studies that had been done in order to identify the developmental pathway of soccer players (Ford & Williams, 2012; Ford et al., 2012) while in Malaysia, similar studies had been done on badminton players (J. F. L. Low et al., 2017) and swimmers (Tan & Low, 2014) but there is still lack of studies that investigate on elite soccer players in Malaysia. In addition, the engagement in practice also plays an important role in developing expert performance. When practice histories are collected, this is typically done with respect to the global development of expertise rather than the more specific development of component skills like anticipation. Previous studies had investigated soccer practice activities but found a contradicting result when a study done by Partington and Cushion (2013) that investigated the coaching behaviours of elite English youth soccer coaches in different practice settings and gained insight into the coaches' cognitive processes underpinning these behaviours and showed that coaches preferred to use training form activities while Hall et al., (2016) who examined the microstructure of coaching practice of the female head coach

of a national rugby union team throughout a whole season during both training and competition showed that more time had been spent in practice activities during playing form activities compared to training form. Although a number of studies examined the structure of the practice activities engaged by elite youth athletes, the information regarding the types of practice activities that were led by coaches among elite soccer players in Malaysia need further investigation. The idea is to provide a representative picture of coach-led practice environments within Malaysian soccer environment. The types of training that are required generally mimic the competitive demands of match-play as well as a consideration of the practical constraints placed on the training programme as being recommended by Unnithan et al., (2012) that the identification of key outcome measures that can be used as talent identification and talent development tools within match-play settings also warrants further investigation. Therefore, SSG training is currently the most common method being used by coaches as it can replicate the nature of competitive match-play. Sampaio et al., (2014) clarified that SSG is suitable and provides proper training drills for all age levels and standards of play and can simultaneously improve players' fitness components and technical abilities compared to traditional methods. Previously, many studies investigated the effects of SSG on certain variables, such as either on fitness components or technical skills variables alone. To date, there is still lack of studies that investigate the effect of SSG on both variables simultaneously as it may also be beneficial in talent identification. However, the application of SSG drills needs to be designed carefully as it involves many variables which can affect multiple components simultaneously. To be different, this study had designed the SSG training by including the modification of pitch area, multiple number of players, specific work to ratio period and rules modification in order

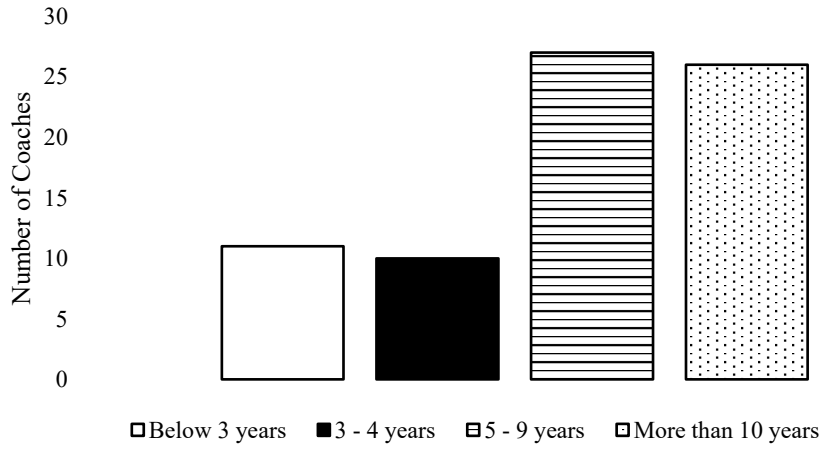
to improve 5 critical components in soccer including agility, speed, cardiovascular endurance, dribbling skills and passing skills simultaneously.

1.2.1 Coaches Perspective Survey

In addition, an e-survey had been done on coaches on their perspectives towards the soccer development program, training structure and also the effect of SSG on soccer players. In this survey, there were 74 coaches in Malaysia who had voluntarily involved to answer the questionnaire including head coaches, assistant coaches, goalkeeper (GK) coaches and fitness coaches who were coaching from grassroot up to the national level. Referring to Figure 1.1, the majority of them (36.5%) had between 5 – 9 years of coaching experience, followed by more than 10 years of coaching experience (35.1%), below than 3 years (14.9%) and lastly 3 - 4 years of coaching experience (13.5 %).

Figure 1.1.

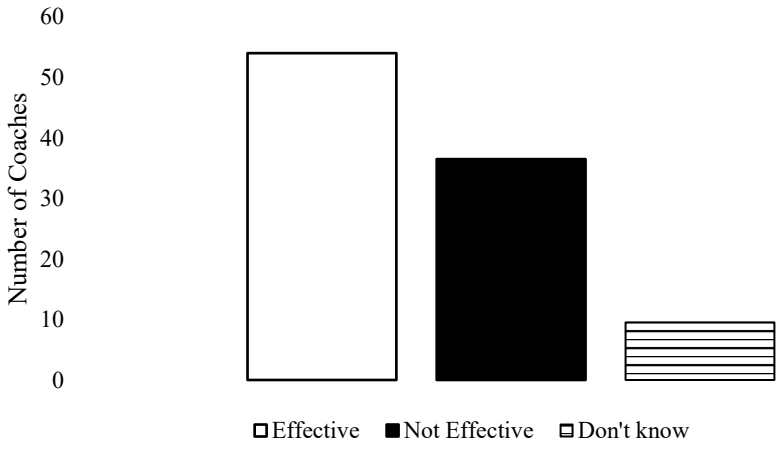
Duration of coaching experience



There were 73 coaches (98.6%) from a total of 74 respondents coaches where almost every coaches know and are alert that Malaysia has soccer development programs but only 56.8% of them had never involved in the program. In addition, as illustrated in Figure 1.2, more than half of the coaches (54%) responded that Malaysian development program has a positive effect towards the current Malaysia's performance while 36.5% responded as not effective and 9.5% as do not know.

Figure 1.2.

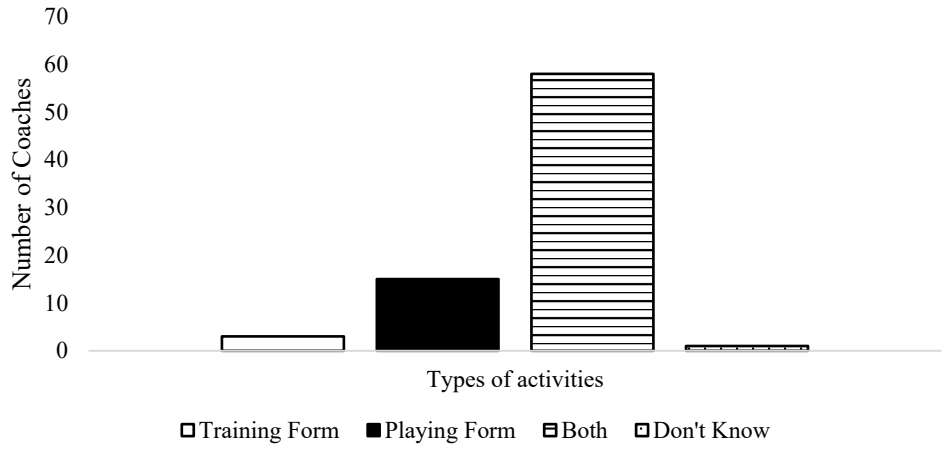
Respond on the effectiveness of soccer development program



Apart from that, as depicted by Figure 1.3, the majority of the coaches (78.4%) responded that the types of training that are suitable to train an individual to become an elite player are by using both training and playing form activities.

Figure 1.3.

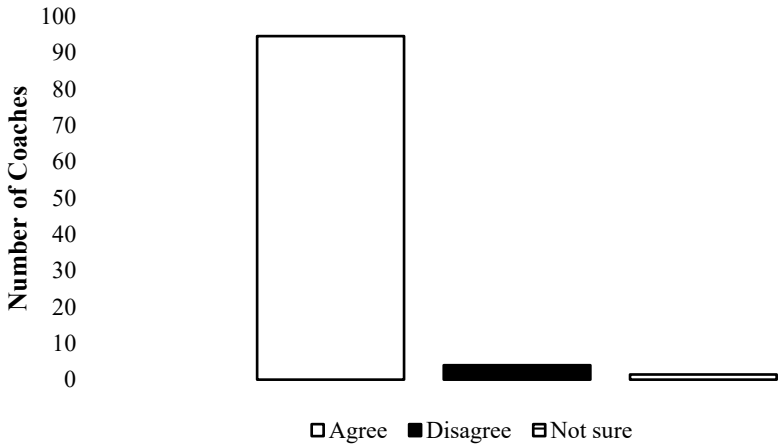
Types of activities towards becoming an elite performer



All coaches know and are alert with the existence of SSG training. In addition, from a total of 74 coaches, Figure 1.4 shows that there were 85.1% who had gained the information from soccer courses, 71.6% from soccer experience, 27% from social media, 25.7% from peers, and only 2.7% from others. Apart from that, 91.9% believed that the application of SSG is beneficial for skill-related fitness components, followed by decision making (86.5%), health-related fitness components (75.7%), others (6.8%) and there was no response for not sure. Lastly, the majority of the coaches (94.6%) believed that SSG is a great practice for soccer players while 4% disagreed and 1.4% stated not sure.

Figure 1.4.

The effectiveness of SSG training on soccer players



1.2.2 Study 1

In Malaysia, there are multiple criteria for youth soccer players to be selected into the team, usually based on the performance on the field. Even though there were certain studies which had been done towards the development pathway of elite performers in Malaysia, investigations on soccer players is still lacking. In addition, despite a lot of studies which had investigated the pathway towards expert performance, there are still some limitations which need to be improved when previous study had compared between participants who were coming from different eras/generations (Huxley et al., 2017). Therefore, this study had been improvised by identifying the developmental pathway (age milestones, soccer-related activities and other sports participation) of elite u-22 soccer players and comparing it to university-based soccer players who played at similar generation. To date, there is still no study that had been done specifically on elite u-22 soccer players in Malaysia eventhough majority of coaches' had agreed that

Malaysian current soccer development program give a positive effect towards Malaysian performance as illustrated at Figure 1.2. Therefore, in order to close the gap, this study intends to investigate the developmental pathway of elite u-22 soccer players in Malaysia. However, even though the number of practice hours had been investigated, the activities during training towards elite performance still remain unclear and need further investigation.

1.2.3 Study 2

Microstructure of practice activities were divided into training and playing forms. Numerous studies had investigated the practice activities on sports and found the different findings, such as study by O'Connor et al., (2018), during training sessions on youth soccer coach in Australia, showed that they spent more time on Playing Form (40.9%), followed by inactivity (31%), Training Form (22.3%), transitions between activities (5.8%), while the study by J. Low et al., (2013) was done on cricket players in England during training session showed that coaches were focusing more on Training Form (69%), followed by Playing Form (19%) and then others (12%). However, in other perspective, Malaysian coaches had agreed that both types are suitable to train an individual to become an elite player as being showed at Figure 1.3. For this study knowledge, there is no scientific investigation on the microstructure of practice activities on Malaysian soccer players which had been done previously. In addition, there are some limitations from previous study that had been addressed which are resting time was not separated from the playing form activity which directly lead the percentage and time spent for playing form activity is likely to be over-reported (A.

Miller et al., 2017). Therefore, this study was improvised by transferring the resting time into the transition which can avoid bias in calculating the percentage of practice activities. To date, there is still no study which had been conducted to investigate the microsctuture of soccer players in Malaysia. Therefore, this study intends to identify the microstructure of training that were led by coaches on elite u-22 soccer players and to compare it to university-based soccer players in 8 weeks training sessions.

1.2.4 Study 3

SSG becomes a popular training method that has been used by coaches in designing training programs as it can replicate the actual match-play demand. This also being agreed by coaches in Malaysia where majority of them were agreed that SSG training might give the positive effect on soccer players as being illustrated at Figure 1.4. A large number of total competitive fixtures due to longer seasonal competition as well as multiple competitions that have been participated require players to travel frequently from one venue to another, giving the limits to the time that is available to undertake the training session during competitive season becoming as one of the restrictions and barriers that directly require the need for a better training approach to train the players by devising sessions that can produce simultaneously on the development of fitness components and technical abilities. However, even there were a lot of studies that had investigated the effectiveness of SSG training, but still there are some limitations that need to be improved such as; (1) the number of participants was limited (16 - 19 subjects) (Fenner et al., 2016; Práxedes et al., 2018) (2) the training had been done on artificial pitch which might have allowed for less variability in the movement of the

ball (Bennett et al., 2018), and (3) the comparison with two training interventions was without control group (Eniseler et al., 2017; Özcan et al., 2018). Therefore, this study had been improvised by adding the number of participants up to 60 subjects, training on the normal pitch and comparing between interventions with control group. For this study knowledge, there were several investigations which had been done on the effectiveness of SSG but there is still no study which investigated the effectiveness of SSG training towards player's technical skills (passing and dribbling) and fitness components (cardiovascular endurance, agility and speed) after 6 weeks training program on elite u-22 soccer players in Malaysia and compared it to university-based soccer players.

1.3 Objective of the study

- Study 1 - To identify the developmental pathway (age milestones, soccer-related activities and other sports participation) of elite u-22 soccer players and compare it to university-based soccer players.
- Study 2 - To identify the microstructure of training that has been used on elite u-22 soccer players and compare it to university-based soccer players in 8 weeks training sessions that are led by the coaches.
- Study 3 - To investigate the effectiveness of small-sided games training on player's technical skills (passing and dribbling) and fitness components (cardiovascular endurance, agility and speed) after 6 weeks training program on elite u-22 soccer players and compare it to university-based soccer players.

1.4 Research Hypothesis

$H_0$1 ÷ There is no significant difference in age milestones between elite u-22 and university-based soccer players.

$H_0$2 ÷ There is no significant difference in soccer-related activities between elite u-22 and university-based soccer players.

$H_0$3 ÷ There is no significant difference in other sports participation between elite u-22 and university-based soccer players.

$H_0$4 ÷ There is no significant difference in microstructure of training between elite u-22 and university-based soccer players.

$H_0$5 ÷ There is no significant difference in pre- and post-agility time after 6 weeks of SSG training on elite u-22 soccer players.

$H_0$6 ÷ There is no significant difference in pre- and post-speed time after 6 weeks of SSG training on elite u-22 soccer players.

$H_0$7 ÷ There is no significant difference in pre- and post-cardiovascular endurance level after 6 weeks of SSG training on elite u-22 soccer players.

$H_0$8 ÷ There is no significant difference in pre- and post-passing time after 6 weeks of SSG training on elite u-22 soccer players.

$H_0$9 ÷ There is no significant difference in pre- and post-dribbling time after 6 weeks of SSG training on elite u-22 soccer players.

$H_0$10 ÷ There is no significant difference in agility between elite u-22 and university-based soccer players.

$H_0$11 : There is no significant difference in speed between elite u-22 and university-based soccer players.

$H_0$12 : There is no significant difference in cardiovascular endurance between elite u-22 and university-based soccer players.

$H_0$13 : There is no significant difference in passing between elite u-22 and university-based soccer players.

$H_0$14 : There is no significant difference in dribbling between elite u-22 and university-based soccer players.

1.5 Operational Definition

An operational definition is a method in designing the concept of detailed definition on the terms that have been used in order to measure a specific variable. The variables that are defined in this study are shown below.

1.5.1 Developmental Pathways

For developmental pathway, this study took a record regarding the players training history based on:-

a) Age milestones – This refers to the age when the players started to involve in soccer.

b) Soccer-related activities – This refers to the amount of hours that were spent by players either in structured (matches, coach-led practice and individual-led practice) or unstructured (peer-led practice).

c) Other sports participation – This refers to the engagement in other sports for at least 3 months.

The methods that had been used to identify the developmental pathway was Participation Histories Questionnaire (PHQ).

1.5.2 Training Form

Activities that can be defined as traditional practice activities that focus on an individual or one skill at a time such as passing with the teammates. The sub-activities that may include are: -

a) Conditioning – training on fitness components such as cardiovascular endurance and agility that had been done either individually, in pairs or in a small group.
b) Technical – training on fundamental soccer-related specific skills such as passing, shooting and dribbling that had been done either individually, in pairs or in a small group.

1.5.3 Playing Form

Activities that may relate to the game-based situation for the development of perceptual-cognitive skills**.** The sub-activities may include: -

a) Tactical - training session either by playing with modification of the pitch area or full side and sometime being paused ~~at~~ several times for correction.

b) Match-Play - playing a full side game.

c) Small-sided Games – playing with modification of the pitch area, with less number of players and modification of playing rules.

1.5.4 Others (transition)

Activities excluding Training and Playing form sub-activities such as transition between one session to another session, refreshment (drinking water), team talk and others.

1.5.5 Small-Sided Games (SSG)

SSG refers to the training intervention that modifies games by reducing the pitch area, using adapted rules and implementing a smaller number of players. This study used:

- Pitch area = 25 m x 20 m.
- Adapted rules including (1) touches - unlimited and 2-3 touches, (2) goal scoring method - ball possession, stopping ball inside zone and mini goal post and (3) number of players = 5 vs 5 and 3 vs 3 format.

1.5.6 Agility

Agility can be known as the ability of the players to rapidly change a direction while balancing their body without falling. Operationally, this study used Agility T-test in determining players' agility.

1.5.7 Speed

In this study, speed is defined as the quickest movement / acceleration which players can perform in a short period of time in a specific distance. Operationally, this study used 30 m sprint test in determining the players' top speed.

1.5.8 Cardiovascular endurance

The ability of the heart to pump and supply enough blood that contains oxygen to the working muscle. Operationally, this study used Yo-Yo Intermittent Recovery Tests Level 1 (YYIRTL1) in order to measure players' cardiovascular endurance. The distance covered during the test then being convert into VO_2max by using the formula from Bangsbo et al., (2008):-

$$VO_2\text{max (mL/min/kg)} = [\text{distance (m)} \times 0.0084] + 36.4$$

1.5.9 Dribbling

Player in possession or controls a ball at their feet, runs with the ball and beats an opponent without being intercepted. This study used Slalom Dribble Test in order to measure the players' dribbling skills.

1.5.10 Passing

Player in possession or controls a ball, sends the ball to a team mate by using all parts of the body except hands, on the ground or in the air. This study used Loughborough Soccer Passing Test (LSPT) in order to measure the players' passing skills.

1.5.11 Elite U-22 Soccer Players

This study defines elite u-22 soccer players as players who represented a soccer team in the President Cup 2019 and above.

1.5.12 University-Based Soccer Players

This study defines university-based soccer players as players who are currently involved in competitions at university level either at national or international level.

1.6 Limitations of the Study

A limitation of the study refers to aspects of a research that is unable to be controlled, which represents weaknesses of the study and that negatively can affect the result of the study (Baumgartner & Hensley, 2006). It means that the constraints that cannot be controlled in the study. This study had some limitations that can be improved in future studies. For study 1, this study used retrospective methods which required individuals to recall their practice histories from the beginning of their participation up to one or

two decades earlier while for study 2, the limitation was the recording video did not reflect the whole training season. Lastly, the limitation for study 3 was the number of players had reduced because as a feeder team, players had been called up from the senior or national team and were also facing injury since this intervention was done during competition phase.

1.7 Delimitations of the Study

Delimitation can be defined as the study has set boundaries for the research, in effect, "fencing it in" (Baumgartner & Hensley, 2006). It means that the constraints have been set in the study. This study had set the delimitations that only focused on elite u-22 players who represented the President Cup Squad 2019 and non-elite players who were currently representing their universities, colleges or soccer amateur clubs (study 1, 2 and 3), the duration of recording was within 8 weeks (3 times per week) (study 2) and SSG training was implemented during competitive season that had been done in 6 weeks for the elite team only (twice a week) (study 3).

1.8 Importance of the Research

The study was conducted in order to investigate the developmental pathway of elite u-22 soccer players, analyse the microstructure of practice activities towards elite performance and investigate the effectiveness of SSG training on players' technical skills and fitness components after 6 weeks of training program. The findings of this study can be used as an effective tool or reference for a variety of reasons such as

determine the potential or future athletes through their developmental pathway, identify the suitable types of training activities towards achieving the elite performance and the effect of SSG method as a suitable tools of training methodology in improving multiple components simultenpusly. In addition, the data can also be used with the expectation to change, improve or enhance performance during match-play as well as assisting the sustainaibility at the peak performance in the long period of time. Therefore, the findings of this research will provide scientific data that will help coaches to create varieties and versatility in identifying athletes and developing training programs in order to enhance higher performance and will be beneficial for team formation and strategy planning as for successful participation at the elite level. Last but not least, the findings of this study can contribute to a better coaching sciences body of knowledge.

1.9 Summary

In summary, this chapter has covered the introduction part of the investigation. Basically, this study has three different studies. This chapter has covered the problem that arose on each study, explained clearly about the objective of each study, developed the research hypothesis based on the objective, defined the important terms in the research, declared about the study limitations and justified the importance of the research either directly or indirectly.