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JKR

CRITICAL SUCCESS FACTOR in JKR PROJECT CONSTRUCTION PHASE

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1. INTRODUCTION & PROBLEM STATEMENT


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1-1. INTRODUCTION

- JKR is government body to implement and execute all related government ministries since 1st Malaysia plan (1966~1970).
- Project **delivery on time** is crucial to support the implementation of Malaysia Plan for every 5 years .
- According to JKR Project Status Report, (Jun, 2013) 677 projects are being implemented and average of **39% of delay** rate in project stages
- The success of the project is the heart of project management and top priorities to the project manager (Muller and Jugge, 2012)
- Delay in construction industry is phenomenon (Sambasivan and Soon, 2006)

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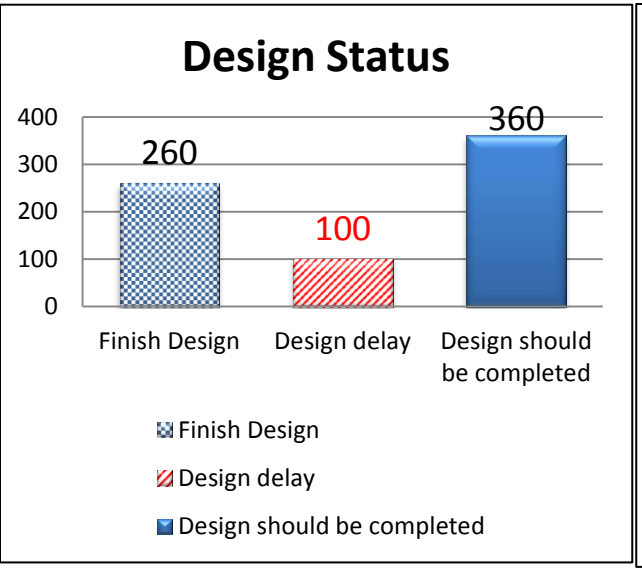
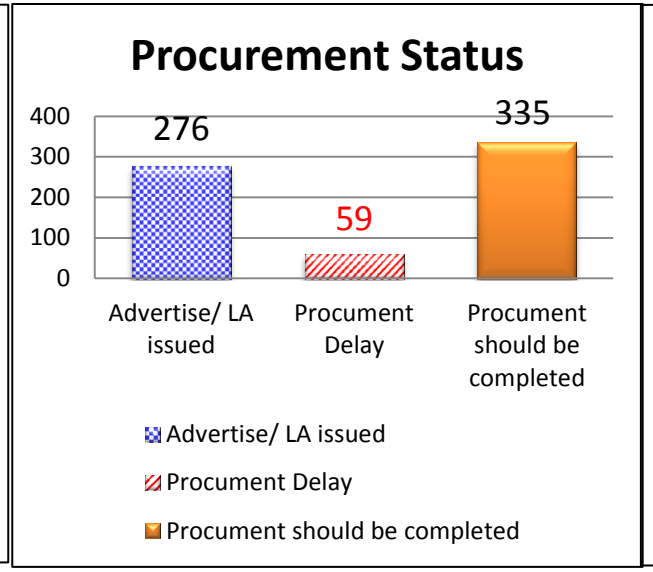
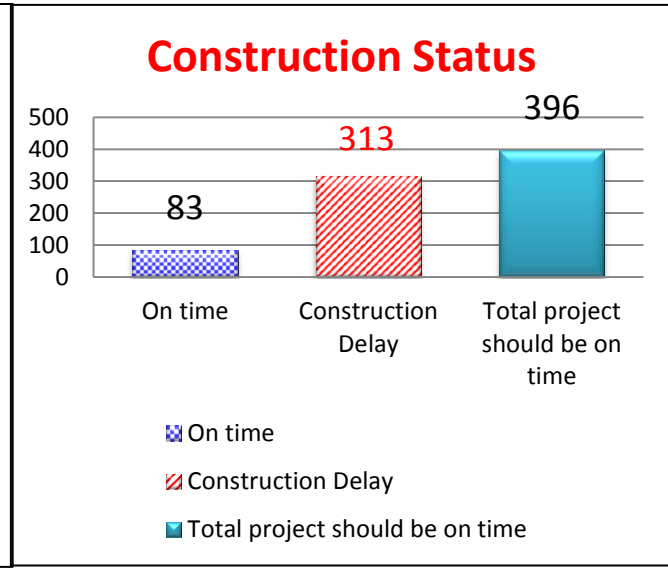
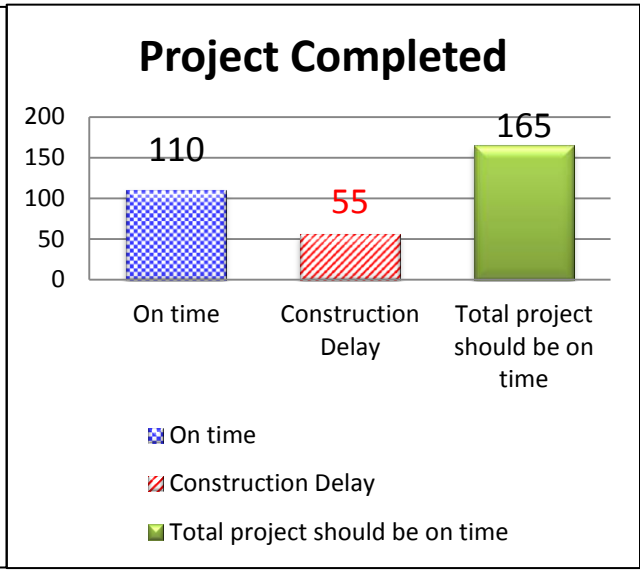
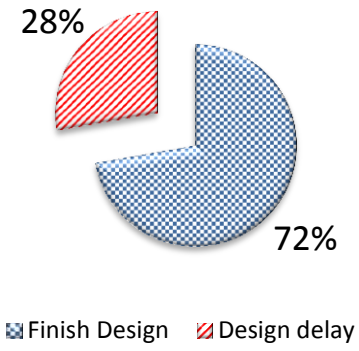
1-2. RESEARCH PROBLEM

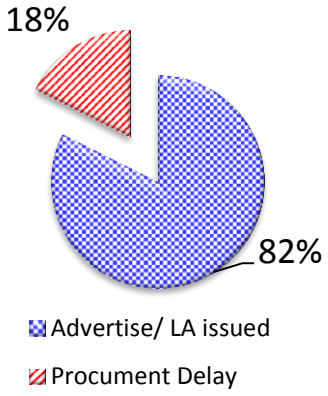


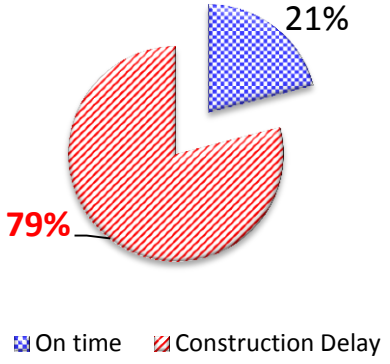


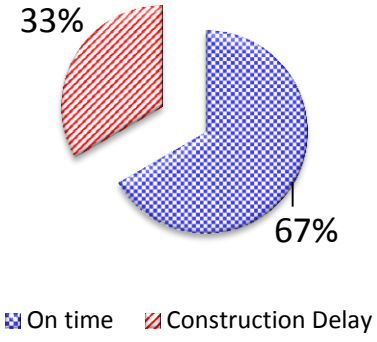












(JKR Project Status Report, JUNE 2013)

1-3. PROBLEM STATEMENT

Key issue related to JKR's Project

i. **Slows progress** in construction
ii. Project **cost overrun**
iii. **Delays in project delivery** to client
iv. **Poor quality** & **workmanship**

In order to reduce these shortfalls, JKR need to establish the knowhow about CSF in construction project. The most influence factor that determine success of JKR construction projects need to be addressed.

2-1. RESEARCH QUESTIONS & OBJECTIVES

RESEARCH QUESTION	RESEARCH OBJECTIVE
1. What are the influential factor that determine success of a construction project?	To determine **critical success factors in construction** projects
2. What are the most influence factors in JKR construction phase?.	To investigate the **most** critical success factors in construction phase of the JKR projects.

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2-2. SCOPE OF STUDY

The scope of the study:-

- Focused only on **construction project** (physical project) regardless of the procurement method.
- Limited of **construction phase** due to limitation of time
- Questionnaire survey will be distributed randomly among JKR staff (internal stakeholder) and to client, consultant and contractor (external stakeholder) who **involve directly** in JKR project.

LITERATURE REVIEW (cont.)

- **Project** is defined by series of an activity or task in project such as **Specific time**, define **start and end**, limited **budget**, using **human** and **nonhuman** (money, people or material) (Kerzner, 2008)
- Traditionally **Project success** is defined by the **Iron triangle** (Time, cost, quality) (Atkinson, 1999)
- Kerzner, (2008) define the project success as completion activity base **on time, cost and performance**
- Nowadays, it`s has change to by adding:

1). within the agreed time,
2). within budget cost,
3). with proper specification,
4). acceptance by client,
5). mutually agreed to scope changes,
6). without disruption to the main workflow
7). without affecting the Corporate culture.

LITERATURE REVIEW (cont.)

Critical Success Factor is defined by:

- a **limited number of condition** or variables which have a **serious impact** on the effectiveness, efficiency viability for the project (Mahmood and Shahrukh, 2012)
- as a factor which need to a management **special attention** because they will give a **major impact** to the organization (Hutching and Christofferson, 2001)
- Ika et. al, (2012) referring to Pinto and Slevein (1988) and defined CSFs as **condition, event and condition** that contribute success to the project outcome.

LITERATURE REVIEW(cont.)

Critical Success Factor is defined by (cont.):

- …as the **important element** to achieve its goal and mission success. The Project Manager should execute the CSF with the **special and continuous attention** to ensure success in managing project (Archiball et. al, 2012).

For this study, CSF will be referred as:

- …as a **small number of things** which is really **important** for the industry to focus in order to achieve success (Yong and Mustafa, 2012)

LITERATURE REVIEW(cont.)

Project Life Cycle:

Defined as **a collection of time** which name and number will decide by the management of the organization (PMI, 2013)

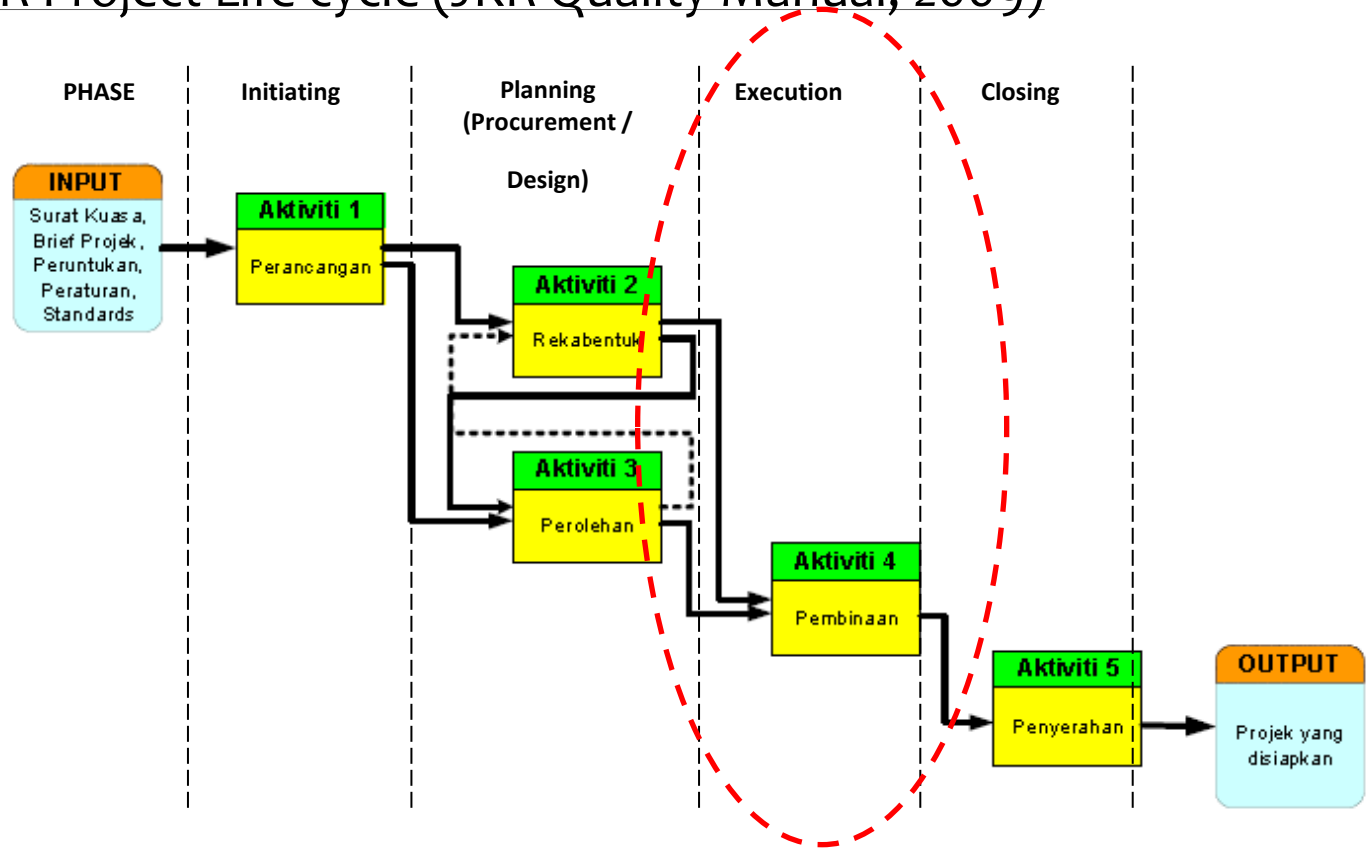
Project phases:

- Defined as a **division** in the project life cycle which needs an extra care to manage the completion of a major deliverable
- Number, the need and the degree of control in each phase will depend on the **sizing, complexity and impact** of the project (PMI, 2013)

The definition of Project Life cycle and project phase

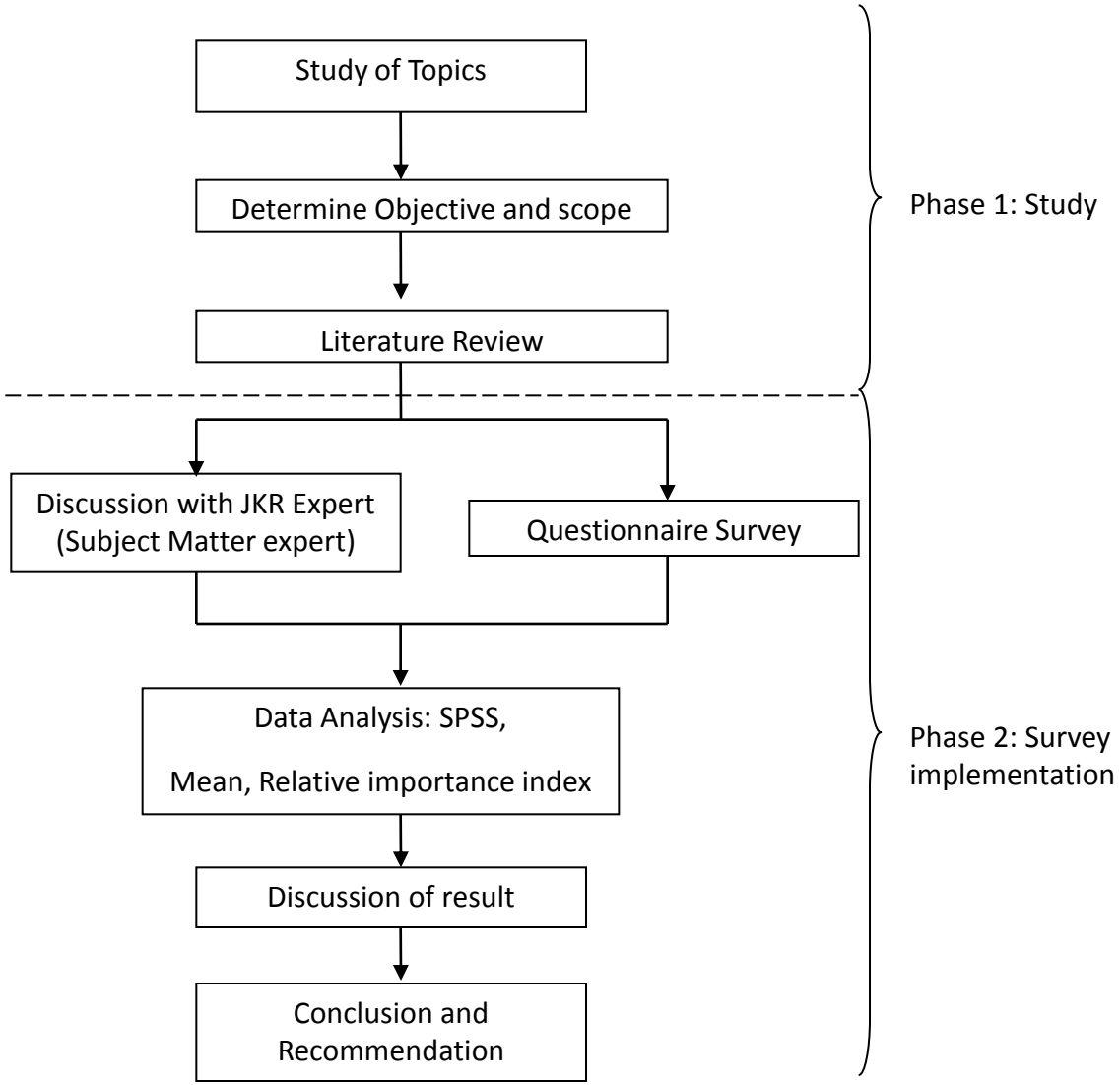
LITERATURE REVIEW(cont.)

JKR Project Life cycle (JKR Quality Manual, 2009)



The study will focus on Construction (Execution) phase

4. MEHODOLOGY



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4-1. POTENTIAL CSF's

From 11 literature review a total of 222 potential of CSF's has been determined:

1 • Financial capability-*Client*
2 • Control of subcontractors works-*Contractor*
3 • Competence-*Consultant*
4 • Cooperation in solving problems- *Consultant*
5 • Competence-*Team Leader*
6 • Commitment- *Consultant*
7 • Skilful workers- *Contractor*
8 • Adequacy of design details and specifications- *Contractor*
9 • Industry-related issues (availability of resources)-*External*
10 • Commitment- *Contractor*
11 • Communication among project stakeholders- *Consultant*
12 • Involvement to monitor the project progress-*Contractor*
13 • Effective allocation of manpower-*project overall*
14 • Shared authority and responsibility between the clients, consultants and contractors-*procurement*
15 • Nature (weather conditions) - *External*
16 • Funds availability with the employer for the project
17 • Contract rates
18 • Professional and technical skills
19 • Rapport with the employer
20 • Financial strength of the company
21 • Decision making processes of the client
22 • Registration category in Local Engineering Council
23 • Market credibility
24 • Contract management
25 • Testing system of executing work
26 • Availability of technology and machinery
27 • Abnormal weather effects
28 • Reputation as pay master
29 • Area of specialization
30 • Team work
31 • Employee motivation
32 • Availability of material confirming contract specifications
33 • Project management
34 • Market stability
35 • Availability of skilled workers
36 • Past experience of similar projects
37 • Organization management system
38 • Political stability
39 • Openness to adopt new technology
40 • Knowledge and experience
41 • Corporate Social Responsibility (CSR)
42 • Training and development
43 • Organizational structure
44 • Nature of the project and its location
45 • Empowerment
46 • Clear company missions and goals
47 • Effective communication lines
48 • Health and safety
49 • Control on cost of poor quality
50 • Public relationship skills
51 • Project Mission,
52 • Top Management Support
53 • Schedule/Plan
54 • Client consultation
55 • Personnel
56 • Technical Task
57 • Client acceptance
58 • Communication
59 • Troubleshooting
60 • Contractor improper planning,
61 • Poor site management,
62 • Contractor experience,
63 • Client finance,
64 • Problem with Subcontractor,
65 • Material shortage,

Total : Samples of 222 potential CSF's

4-1. POTENTIAL CSF's (cont.)

~potential of CSFs (cont.):

170 Benefit to users
171 Project functionality
172 Value for money
173 Easy to maintain
174 Fast rectification of defects
175 Meets pre-stated objectives
176 Exploitation of technology
177 Increase levels of profess. Develop
178 Develop new knowledge & expertise
179 Develop new business relationship
180 Generate positive reputation
181 Accomplish core business needs
182 Meets stakeholders' needs & expect
183 High profit margin
184 Excellent Commissioning programmed
185 Early occupation
186 Meets corporate missions
187 Aesthetic value
188 Pleasant environment
189 Usable life expectancy
190 Excellent Close-out process
191 Supported by warranty programmed
192 Minimum cost of ownership
193 Flexible for future expansion
194 New market penetration
195 Lower depreciation cost

196 • Support from senior management
197 • Clear realistic objectives
198 • Strong/detailed plan kept up to date
199 • Good communication/ feedback
200 • User/client involvement
201 • Skilled/suitably qualified/sufficient staff/team
202 • Effective change management
203 • Competent project manager
204 • Strong business case/ sound basis for project
205 • Sufficient/well allocated resources
206 • Good leadership
207 • Proven/familiar Technology
208 • Realistic schedule
209 • Risks addressed/assessed/managed
210 • Project sponsor/champion
211 • Effective monitoring/control
212 • Adequate budget
213 • Organizational adaptation/ culture/ structure
214 • Good performance by contractors/ consultants
215 • Acceptance of possible failure
216 • Training provision
217 • Political stability
218 • Correct choice/past project management methodology/tools

219 • Environmental influences
220 • Past experience (learning from)
221 • Project size (large)/level of complexity (high)/
222 • Different viewpoints

Total : Samples of 222 potential CSF's

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4.2. CSF's DIMENSION

Summary of CSF dimension by former researcher:

Yong and Mustafa (2012)	Sambasivan and Soon (2006)	Mahmood and Shahrukh (2012)	Belassi and Tukel (1996)	Al-Tmeemy (2011)
• Project related, • Client, • Team Project, • Consultant, • Contractor, • Procurement • External Factor	• Client, • Consultant, • Material, • Labour & equipment, • Contract, • Contract relationship • External Factor	• Human, • Financial, • Organization, • Technical • Environment	• Project • Project manager & team members, • Organization • External environment	• Project management success, • Product success • Market success

Dimension from Yong & Mustafa (2012) was chosen because its similarity to JKR condition

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4.3. QUESTIONAIRE DESIGN

Shortlisted of 38 CSFs in 7 dimensions:

Dimension	Critical factors	Sources
1. Project Management/ Project Related	1. Top management support	Pinto and Prescott (1988), Bellasi and Tukel (1996):, Fortune and White (2005):
	2. Effective allocation of manpower	Yong and Mustafa (2012), Takim et al. (2004), Fortune and White (2005):
	3. Functional managers' support	Bellasi and Tukel (1996):
	4. Scope change (min)	Kerzner (2006), Takim et al. (2004)
	5. Project Mission,	Mahmood and Shahrukh (2012), Pinto and Prescott (1988), Takim et al. (2004), Fortune and White (2005):

4.3. QUESTIONAIRE DESIGN (cont.)

Shortlisted of 38 CSFs in 7 dimensions:(cont.):

Dimension	Critical factors	Sources
1. Project Management/ Project Related	6. Realistic schedule	Pinto and Prescott (1988), Pinto and Prescott (1988)
	7. Adherence to schedule	Pinto and Prescott (1988), Chan and Chan (2004), Kerzner (2006), Takim et al. (2004), Bellasi and Tukel (1996, Fortune and White (2005), Dzarif, Y. (2011)
	8. Meets budget	Kerzner (2006), Takim et al. (2004), Fortune and White (2005)
	9. Adherence to quality target	Chan and Chan (2004), Kerzner (2006), Takim et al. (2004), Dzarif, Y. (2011)
	10. Risks addressed	Fortune and White (2005)

4.3. QUESTIONAIRE DESIGN (cont.)

Shortlisted of 38 CSFs in 7 dimensions:(cont.):

Dimension	Critical factors	Sources
2. Client	11. Funding Availability	Yong and Mustafa (2012), Mahmood and Shahrukh (2012), Sambasivan and Soon (2007), Takim et al. (2004), Dzarif, Y. (2011)
	12. Complete brief & fund by client	Dzarif, Y. (2011)
	13. Client acceptance	Pinto and Prescott (1988), Kerzner (2006)
	14. Client satisfaction of end product	Chan and Chan (2004), Bellasi and Tukel (1996), Takim et al. (2004), Dzarif, Y. (2011)
	15. Client involvement from start	Fortune and White (2005), Dzarif, Y. (2011)

4.3. QUESTIONAIRE DESIGN (cont.)

Shortlisted of 38 CSFs in 7 dimensions:(cont.):

Dimension	Critical factors	Sources
3. Project Team	16. Team Competence	Yong and Mustafa (2012), Mahmood and Shahrukh (2012), Bellasi and Tukel (1996), Fortune and White (2005)
	17. Knowledge and experience	Mahmood and Shahrukh (2012), Ika et. al (2012), Fortune and White (2005)
	18. Effective communication	Yong and Mustafa (2012), Mahmood and Shahrukh (2012), Pinto and Prescott (1988), Sambasivan and Soon (2007), Bellasi and Tukel (1996), Fortune and White (2005)
	19. Effective in monitoring/control	Ika et. al (2012), Bellasi and Tukel (1996), Kerzner (2006), Fortune and White (2005)
	20. Integrity in contract supervision	Dzarif, Y. (2011)
	21. Troubleshooting	Pinto and Prescott (1988), Bellasi and Tukel (1996), Takim et al. (2004)
	22. PBT Approval	JKR Expert (2013)

4.3. QUESTIONAIRE DESIGN (cont.)

Shortlisted of 38 CSFs in 7 dimensions:(cont.):

Dimension	Critical factors	Sources
4. Consultant	23. Professional and technical skills	Yong and Mustafa (2012), Mahmood and Shahrukh (2012), Takim et al. (2004)
	24. Cooperation in solving problems	Yong and Mustafa (2012), Ika et. al (2012)
	25. Complete design within time frame	JKR Expert (2013)
	26. Troubleshooting	Yong and Mustafa (2012), Ika et. al (2012), Fortune and White (2005)
5. Contractor	27. Availability of skilled workers	Yong and Mustafa (2012), Mahmood and Shahrukh (2012), Sambasivan and Soon (2007), Takim et al. (2004)
	28. Control of subcontractors works	Yong and Mustafa (2012), Sambasivan and Soon (2007)
	29. Improper planning,	Yong and Mustafa (2012), Sambasivan and Soon (2007)
	30. Experience	Sambasivan and Soon (2007)

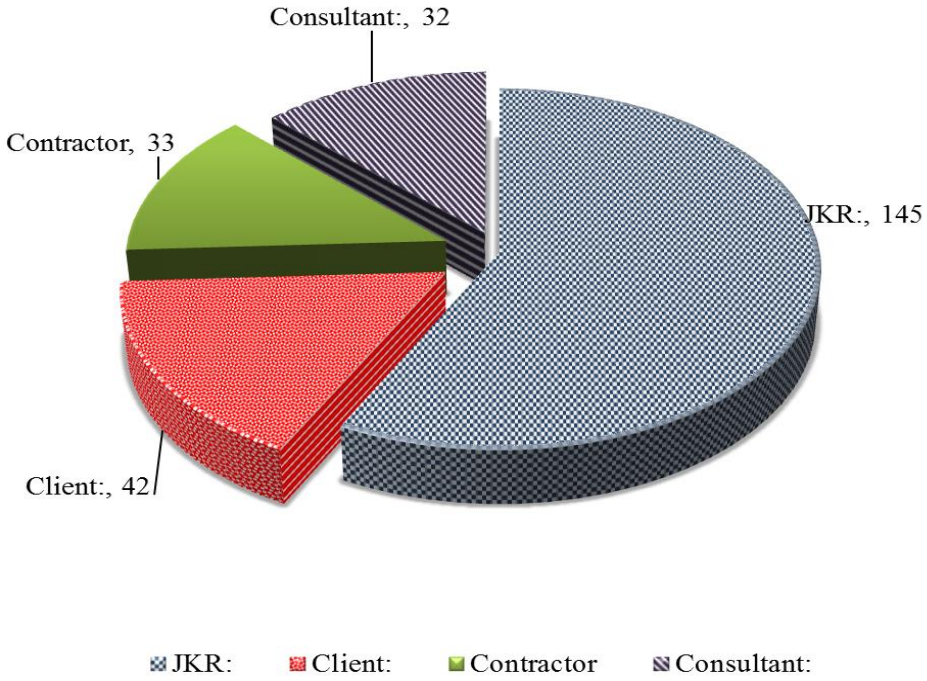
4.3. QUESTIONAIRE DESIGN (cont.)

Shortlisted of 38 CSFs in 7 dimensions:(cont.):

Dimension	Critical factors	Sources
6. Procurement & Contract Admin	31. Financial strength of the company	Mahmood and Shahrukh (2012)
	32. Cost of Contract	Mahmood and Shahrukh (2012), Chan and Chan (2004)
	33. Contract administration	Mahmood and Shahrukh (2012), Takim et al. (2004)
	34. Integrity in contract awarding	Dzarif, Y. (2011)
7. External Factor	35. Nature (weather conditions)	Yong and Mustafa (2012), Mahmood and Shahrukh (2012), Bellasi and Tukel (1996), Takim et al. (2004), Fortune and White (2005)
	36. Meets safety requirements	Mahmood and Shahrukh (2012), Chan and Chan (2004), Kerzner (2006), Takim et al. (2004)
	37. Social / environment	Mahmood and Shahrukh (2012), Bellasi and Tukel (1996), Fortune and White (2005)
	38. Project complexity and its location	Mahmood and Shahrukh (2012)

5.0 DISTRIBUTION OF QUESTIONAIRE

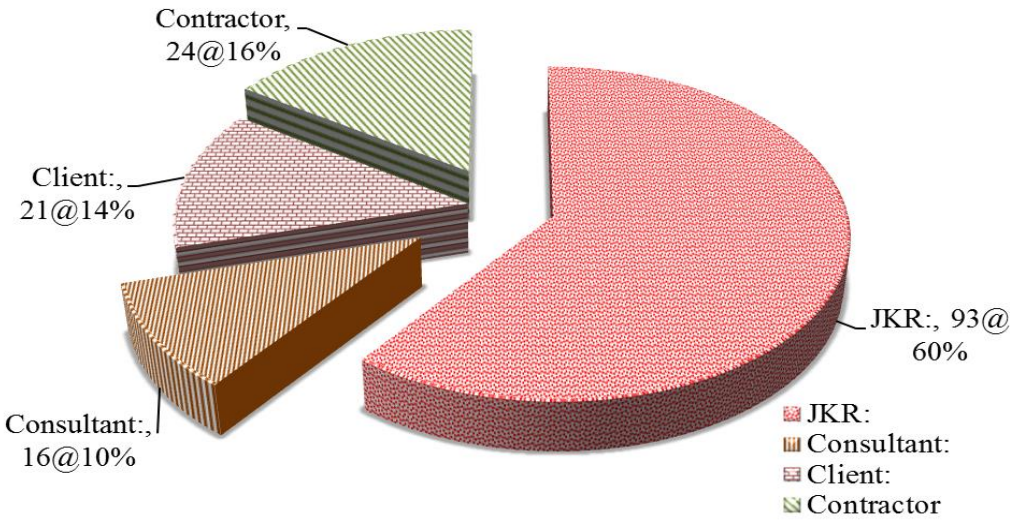
ORGANISATION	FREQUENCY	PERCENTAGE
JKR	145	57.5
Client's Department	42	16.7
Consultant	32	13.1
Contractor	33	12.7
Total	252	100.0



252 survey distributed to JKR (57.5%), Client (16.7%), Consultant (13.1%) and Contractor (12.7%)

5.1 QUESTIONAIRE RESPOND RATE

ORGANISATION	DISTRIBUTED	TOTAL RETURN	RESPONSE RATE
JKR	145	93	64%
Client's Department	42	21	50%
Consultant	32	16	50%
Contractor	33	24	73%
Total	252	154	61 %

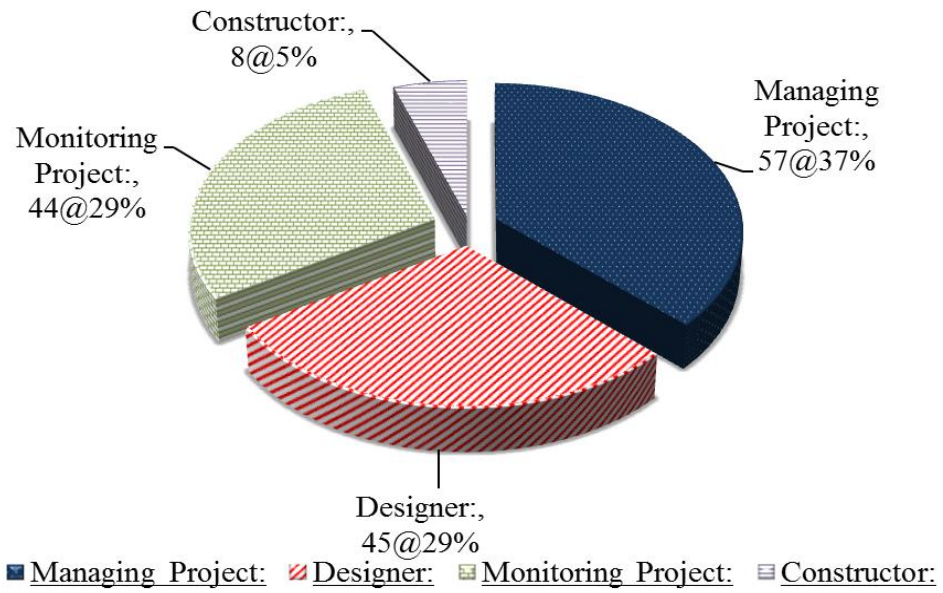


154 survey returned : JKR (60%), Client (14%), Consultant (10%) and Contractor (16%)

RESULT AND DICUSSION

5.2 RESPONDENT DEMOGRAPHY

ORGANISATION	FREQUENCY	PERCENTAGE
Managing Project	57	37.0%
Designer	45	29.2%
Monitoring Project	44	28.6%
Constructor	8	5.2%
Total	154	100%



154 survey returned : Manage project (37%), Designer (29%), Monitoring(29%) and Constructor (5%)

RESULT AND DICUSSION

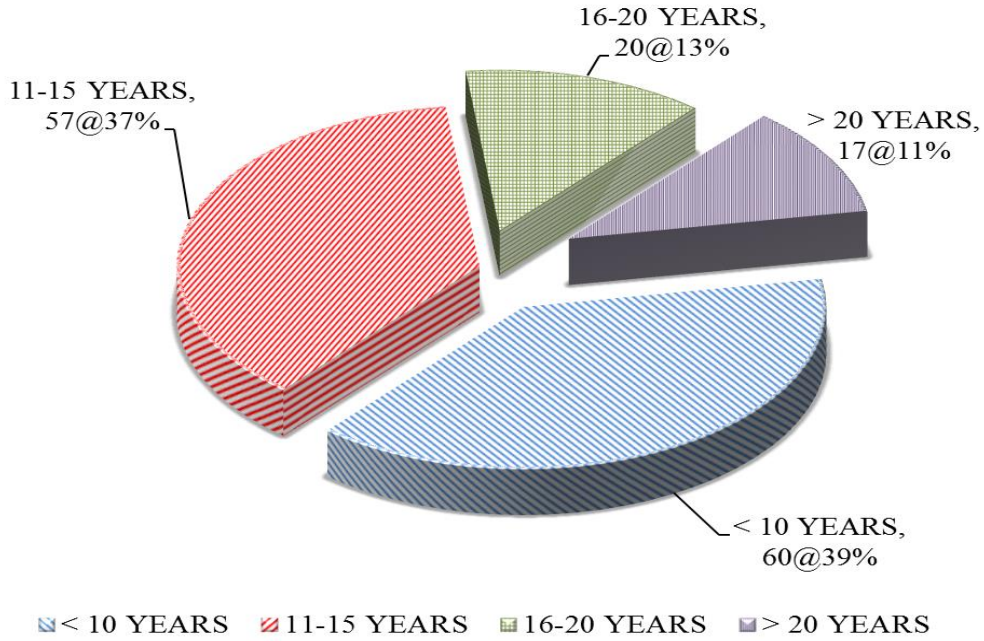
5.3 CROSS TABULATION OF PROFESIONAL INVOLVEMENT

Organization	PROFESIONAL_INVOLVEMENT				Total
	Managing Project	Designer	Monitoring Project	Constructor	
JKR	31	36	26	0	93
Client's Department	9	0	12	0	21
Consultant	6	8	2	0	16
Contractor	11	1	4	8	24
Total	**57**	**45**	**44**	**8**	**154**

154 survey returned : JKR (40% - Designer & 33% Managing project), Client -57% monitoring project, consultant (50% designer) and contractor (45%-managing project).

5.4 WORKING EXPERIENCE

YEARS OF EXPEIENCE	FREQUENCY	PERCENTAGE
< 10 years	60	39.0%
11 - 15 years	57	37.0%
16 - 20 years	20	13.0%
> 20 years	17	11.0%
Total	154	100%



154 survey returned : <10 years (39%), 11~15 years (37%), 16~20 years (13%) and >20 years (11%)

5.5 CROANBACH'S ALFA (cont)

Reliability Statistics	Number of items	Cronbach's Alpha
Project Management	10	0.862
Client	5	0.772
Project Team	7	0.900
Consultant	4	0.906
Contractor	4	0.841
Procurement & Contract Admin	4	0.824
External factor	4	0.705

- Value ≥0.7 is reliable and non-bias or error free. (Marija, 2007); nearly 1 indicates higher consistence (Sekaran, 2003)
- From results min is 0.705 and shows the higher internal consistency of the data

5.6 NORMALITY TEST & FACTOR ANALYSIS

NORMALITY TEST:

- Histogram Plot – all categories bell-shaped
- Q-Q Plot – all categories straight line plot & with positive slope
- **Data is normally distributed**

FACTOR ANALYSIS (data reduction & identify group variables)

- Number inside each cluster **> 3 items** (Chua, 2006)
- Result **KMO Value >0.6 determines the suitability of using factor analysis on data**(Coakes, 2010)

5.7 RELATIVE IMPORTANT INDEX (RII)

- **RII** used to determine level of importance CSF's that influence the success of construction (Mahmood and Shahrukh, 2012)

$$RII = \frac{\sum\{(n_1 \times 1) + (n_2 \times 2) + (n_3 \times 3)\ (n_4 \times 4) + (n_5 \times 5)\}}{\sum(n_i \times 5)}$$

Where,

RII = Relative important index; n_i= Frequency of chosen Likert value *i*

1,2,3,4 & 5 = Likert Scale chosen

- The value of RII range from **0 to 1** (Tam et al. 2004)
- Value **0 described lowest** while value of **1 described maximum** strength
- **More value** of RII means **more important factor** to CSF
- The CSF were arranged in **descending** order

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5.8 CRITICAL SUCCESS FACTOR : JKR PERSPECTIVE (Top 3 CSF's)

Dimension	Critical Success Factor	Mean	RII Value	Rank
Project Team	D3- Effective Communication	4.505	0.901	1
Consultant	E1- Professional and Technical Skills	4.440	0.888	2
	E4- Integration of Design and Construction	4.397	0.880	3

JKR respondents: Effective Communication, Technical Skill and Design integration are their top 3 ranking

5.9 CRITICAL SUCCESS FACTOR : CLIENT PERSPECTIVE (Top 3 CSF's)

Dimension	Critical Success Factor	Mean	RII Value	Rank
Contractor	F3- Contractor ability for proper planning	4.476	0.895	1
Procurement	D5- Integrity in contract supervision	4.381	0.876	2
Client	C3- Client acceptance of functionality / quality			
	C1- Funds availability			
Project Management	B2- Effective allocation of manpower	4.333	0.867	3
Project Team	D4- Effective in monitoring/ control			
Consultant	E4- Integration of design and construction			
Project Management	B8- Meets budget			

Client: contractor proper planning is the most critical. Contract supervision, acceptance, fund availability are second rank of CSF.

5.10 CRITICAL SUCCESS FACTOR : CONSULTANT PERSPECTIVE (Top 3 CSF's)

Dimension	Critical Success Factor	Mean	RII Value	Rank
Client	C1- Funds availability	4.375	0.875	1
Consultant	E2- Complete design within time frame	4.250	0.850	2
	E1- Professional and technical skills	4.187	0.838	3

Consultant: Client fund availability as their top most CSF, complete design within time frame as their second CSF and technical skill as their third CSF.

5.11 CRITICAL SUCCESS FACTOR : CONTRACTOR PERSPECTIVE (Top 3 CSF's)

Dimension	Critical Success Factor	Mean	RII Value	Rank
Client	C1- Funds availability	4.416	0.883	1
Contractor	F3- Contractor ability for proper planning	4.375	0.875	2
Project Team	D3- Effective communication	4.250	0.850	3
	D4- Effective in monitoring	4.250	0.850	
Contractor	F1- Availability of skilled worker	4.250	0.850	

Contractor: Client fund availability as their top most CSF, contractor planning as their second CSF and third position shared by 3 factors

5.12 CRITICAL SUCCESS FACTOR : OVERALL PERSPECTIVE (Top 3 CSF's)

Dimension	Critical Success Factor	Mean	RII Value	Rank
Client	C1- Funds availability	4.389	0.878	1
Project Team	D3- Effective communication	4.363	0.873	2
Contractor	F3- Contractor ability for proper planning	4.363	0.873	
Consultant	E1- Professional and technical skills	4.350	0.870	3

Overall 154 respondents: Top most important CSF is Fund Availability, Effective Communication and Contractor ability for Planning are rank second and technical skill is rank third.

5.13 FINDINGS FROM PREVIOUS STUDY

No	CSF's in Project JKR construction phase	Reference from previous study
1	Funds availability	i. **Funds availability** with the employer for the project (Mahmood and Shahrukh, 2012); ii. Client **financial capability**, Yong and Mustafa (2012) iii. Inadequate **clients finance** & payment for completed works, (Sambasivan and Soon, 2006)
2	Effective communication	i. **Communication** between team members (Bellasi and Tukel, 1996); ii. Human-related factor such as competent and **communication**, Yong and Mustafa (2012)
	Contractor ability for proper planning	i. Contractor ability for **proper planning** (Sambasivan and Soon, 2006)
3	Professional and technical skills	i. Professional and **technical skills** (Mahmood and Shahrukh, 2012); ii. Team member **technical background** (Bellasi and Tukel, 1996)

Previous study related to current top CSF's.

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6.1 FINDINGS

RESEARCH OBJECTIVE	FINDINGS
1. To determine critical success factors in construction projects	From 11 journals there are **potential of 222 of CSF's** in construction as describe in section 4.2
2. To identify the most critical success factors in construction phase of the JKR projects.	The CSF's were divided into the perspective of **JKR, Client, Consultant and Contractor**. The **overall perspective** is used to represent the most CSF in construction phase of JKR Project.

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6.2 CONCLUSIONS

- **Focus on these CSF** to improve JKR project management.
- **More participation** of officers in JKR program manager certification and project practitioner program.
- To implement **project preparation assessment** at the early stage of project implementation (minimize possibility of project failure).
- To make use of **ICT tools effectively** such as Microsoft Project during each site meeting to monitor the site progress.

6.2 CONCLUSIONS (cont.)

- **Team work development** for project team and stakeholders to instill the sense of belonging to the project team.
- Improve **project team understanding** and **upgrade their knowledge and competency** in project implementation base on their clearly defined roles and responsibilities.
- **Visualization** should be frequently used as one of the tools to **improve communication** with others to get a better picture of matters discussed to achieve desire results and conclusion.

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Q & A

THANK YOU