

# Construction Industry Indicators Affecting Contractors

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Annual monitoring of the condition of the South African construction industry is vital to enable government and other role players to evaluate the impact of current interventions to timeously and pro-actively implement revised legislation, strategies and development programs to form an updated roadmap for the future well-being and growth of the industry. This monitoring of the construction industry is done annually by the Construction Industry Development Board (cidb) by utilizing construction industry indicators. A database with contact particulars of employers, contractors and agents involved in 3441 projects completed in 2008 was compiled. Three separate survey forms were faxed or e-mailed to the contractors, employers and agents of these projects. Their responses were captured in a Microsoft Access database. The scope of this report is limited to the results received from the contractors. The main findings were that the projects of small up-coming contractors were just as profitable as those of the larger well-established contractors. Only 42% of all contractors were paid on time. The national departments were the worst performers with regard to timeous payment of contractors. This research contributes to the understanding of the construction industry and highlights existing problems to solve on the way forward. Government can make use of the results obtained to timeously and pro-actively implement revised legislation, strategies and development programs to ensure the well-being and growth of the industry.

**Keywords:** Construction industry indicators, cii, key performance, kpi.

## Introduction

The Construction Industry Development Board (cidb) Act (Republic of South Africa 2000) was passed in 2000 to establish a statutory body aimed at driving an integrated construction industry development strategy. This body was necessary as the construction industry plays an indispensable role in the South African economy by providing the physical infrastructure which is fundamental to the country's development. The construction industry operates in a uniquely project-specific and complex environment, combining different investors, clients, contractual arrangements and consulting professions. It impacts directly on communities and the South African public at large, and its improved efficiency and effectiveness will enhance quality, productivity, health, safety, environmental outcomes and value for money. In terms of this act, the cidb 'may develop target and performance indicators related to best practice standards and guidelines and establish mechanisms to monitor their implementation and evaluate their impact'.

Construction Industry Indicators (CIIs) have been developed by the Department of Public Works and the cidb with the assistance of the CSIR (van Huyssteen et al., n.d.) to play a useful role in developing a sustainable industry and to be adopted as a tool for improving performance in the South African construction industry. The CIIs of the cidb rely heavily on international experience and particularly those indicators adopted in the United Kingdom. In the United Kingdom the first Key Performance Indicators (KPIs) were published in 1999 in response to the Rethinking Construction report by Egan (1998). These KPIs had three objectives, namely:

- To provide companies and projects with a simple method of establishing a performance measurement system;
- To provide organisations with a straightforward method of benchmarking their performance against others in the construction industry; and
- To track long term trends in performance, and specifically, to demonstrate whether the construction industry was achieving the targets set out in *Rethinking Construction*. (Rethinking Standards in Construction 2006)

Cost, time and quality are the three basic and most important performance indicators in construction projects followed by others such as safety, functionality and satisfaction (Chan and Ada 2004). Based on the Egan report the Movement for Innovation and Construction Best Practice Programme (CBPP) was formed and is now recognised as a leading organisation involved in the production of KPIs within the industry (Beatham et al., 2004). The KPIs launched by the CBPP are: client satisfaction, product and service, profitability, productivity, defects, safety, construction time and construction cost. These KPIs were benchmarked within the construction industry and have been very successful in introducing many companies to the subject of performance measurement (Beatham et al., 2004).

The cidb CIIs measure the performance of the South African construction industry by measuring employer satisfaction with the project milestone dates achieved, construction costs versus tender amount, contractors' performance, agents' (consultants') performance, and the quality of materials used. The contractors' satisfaction is measured by their profitability, the quality of the contract documentation, the efficiency, openness and transparency of the contract adjudication process, the management of variation orders and claims, payment delays and the performance of their materials suppliers. The procurement indicators measured are obtained from the agents involved and include contractor performance issues utilised in the adjudication of tenders, the type of procurement procedure used, and the contracting strategy adopted.

The cidb CIIs described above have been captured since 2003, and are currently being captured in partnership with the Department of Quantity Surveying and Construction Management of the University of the Free State. This report is part of a series of annual papers (Marx 2008, 2009) presenting the results of this continuous survey project. It is a report on the results of the 2009 survey for projects completed in 2008.

## **Methodology**

A database, with contact particulars of employers, contractors and agents involved in 3441 projects completed in 2008, was compiled. Three separate survey forms were faxed or e-mailed to the contractors, employers and agents of these projects. Their responses were captured in a Microsoft Access database. The average perspectives of the respondents were determined for different project types, employer categories and provinces. All questionnaires made use of the scale to measure satisfaction levels as shown in Table 1.

Table 1

***Definition of the % satisfaction levels***

Dissatisfied			Neither Satisfied nor Dissatisfied				Satisfied		
10	20	30	40	50	60	70	80	90	100

**Scope**

The CIIs of the cidb need to evolve from the lessons learned from previous surveys, and are therefore subject to change and refinement. Furthermore, the CIIs used were only mainline indicators. Questions were not asked to pin-point the exact reasons for all problems experienced.

From the 3441 completed projects in the database, the contact particulars of 3428 contractors, 3252 employers and 2430 agents were available. Survey forms were received back from 1169 contractors, 332 employers and 602 agents reflecting response rates of 34%, 10% and 25% respectively. This report is limited to the results obtained from the contractor survey forms.

**Discussion of the Survey Results**

***Project Type and Employer Category Distribution of Responses Received***

Table 2 gives a distribution of the 1169 survey forms received from contractors for projects completed in 2008. The number and percentage of survey forms completed are indicated for different employer categories and project types.

Table 2

***Contractor survey responses received for different project types and employer categories (2008)***

Project Type	% No.	36,0	17,7	5,7	16,5	8,9	10,4	2,5	2,3	% of Total Survey Results
Residential Building	75	46	6	8	9	3	2	1	-	6,4
Non-residential Building	261	130	29	19	49	8	15	11	-	22,3
Civil Works	400	105	65	21	79	53	70	5	2	34,2
Mechanical Works	82	26	8	10	20	10	6	2	-	7,0
Electrical Works	231	74	70	6	21	21	15	1	23	19,8
Special Works	118	40	29	3	15	9	13	9	-	10,1
Not specified	2	-	-	-	-	-	-	-	2	0,2
<b>Total No. of projects</b>	<b>1169</b>	421	207	67	193	104	121	29	27	
		Private sector	Public Corporation e.g. ESKOM, ACSA	National Department	Provincial Department	Metropolitan Council	Regional/ District Council	Public Private Partnership	Not specified	
		<b>Employer Category</b>								

The majority of responses received came from civil works projects (34,2%), non-residential building projects (22,3%) and electrical works projects (19,8%). The results in this report are presented per project type and per client category to ensure that the results for other types of projects do not disappear in the average of all projects.

Projects of the private sector (36%), public corporations (17,7%) and provincial departments (16,5%) were best represented in the survey. The responses received were well distributed between the different project types as well as between the employer categories. The number of responses received in each category should always be considered when evaluating the results.

*Contractor Financial Grade Distribution of Responses Received*

The contractors are registered with the cidb in different financial grades, indicating their financial capability to complete projects of certain maximum values. The grading is as follows: Grade 1 to 9 correspond with project values of R0,2 million; R0,65 million; R2 million; R4 million; R6,5 million; R13 million; R40 million; R130 million and no limit respectively. Table 3

shows the distribution of the 1169 survey forms received from different financially graded contractors in terms of project types.

Table 3

**Contractor survey responses received per project type and contractor financial grading (2008)**

Project Type	No.	% No.									
		1,3%	12,7%	7,8%	12,6%	18,1%	14,5%	12,6%	5,5%	6,4%	8,5%
Residential Building	75	3	6	5	13	8	10	10	2	5	13
Non-residential Building	261	3	26	18	38	59	33	25	8	19	32
Civil Works	400	3	42	37	31	32	87	70	42	34	22
Mechanical Works	82	2	11	6	7	24	8	19	-	1	4
Electrical Works	231	3	47	10	52	42	24	16	12	8	17
Special Works	118	1	17	15	6	47	6	7	-	8	11
Not Specified	2	-	-	-	-	-	1	-	-	-	1
<b>Total No. of Projects</b>	<b>1169</b>	15	149	91	147	212	169	147	64	75	100
		1	2	3	4	5	6	7	8	9	Not specified
<b>Contractor Financial Grade</b>											

Grade 1 (up-coming, small) contractors were not targeted in this survey due to the fact that most of them do not possess a facsimile machine or have an e-mail address. Therefore, only 1,3% of the responses received came from Grade 1 contractors. A well distributed response was received, with the largest response from Grade 5 (18,1%) and Grade 6 (14,5%) contractors.

*Contractor Survey Response Distribution per Province*

It was also important to determine if the responses received were not dominated by those economic regions in the country with the highest construction activities. Table 4 shows the distribution of contractor survey responses received per province. The percentage of responses received for projects completed in each province are indicated. This was compared with the percentage of cement sales in each province. The cement sales can be considered to be one of the indicators of construction activity in a province. Figure 1 shows the correlation between cement sales and the survey responses received, and indicates that the survey results received were not dominated by any one province. Certain results of this survey are expressed per province to ensure that the situations in less economically active provinces are correctly reflected and do not disappear in the average response received.

Table 4

**Construction survey responses received per project type and province (2008)**

Project Type	No.	%									
		0,4	4,8	22,5	21,4	6,9	7,8	4,7	2,7	18,1	10,7
Residential Building	75	-	7	6	17	3	8	4	1	21	8
Non-residential Building	261	-	11	47	103	2	7	3	4	37	47
Civil Works	400	2	20	97	53	31	28	19	13	87	50
Mechanical Works	82	-	2	16	11	3	19	6	8	12	5
Electrical Works	231	-	10	53	61	31	16	14	3	36	7
Special Works	118	1	6	44	5	11	13	9	3	18	8
Not specified	2	2	-	-	-	-	-	-	-	-	-
Total No. of projects	<b>1169</b>	5	56	263	250	81	91	55	32	211	125
		Not specified	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	Eastern Cape
		<b>Province</b>									

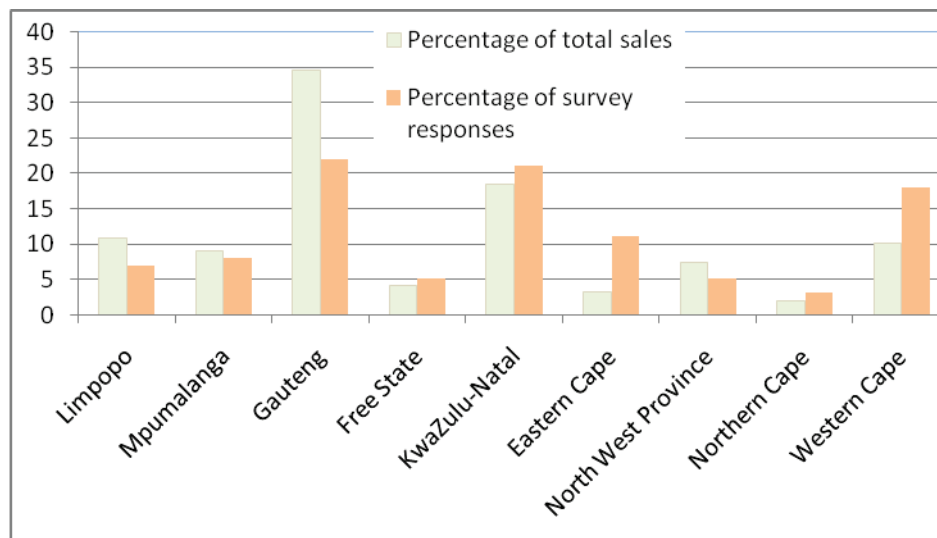


Figure 1: Correlation between contractor survey responses received and cement sales per province (Cement and Concrete Institute)

### Contractor Profitability for Different Project Types

Table 5 indicates the distribution of contractor profitability for different project types and shows that for 4% of all the projects completed the contractors made a loss.

The project types, with the highest percentage of projects with profitability of more than 10%, were special work (52%) and mechanical work projects (51%).

If the percentage of projects completed with 6-10% and more than 10% profit are combined for each project type, the results show that the residential building and non-residential building projects were much less profitable than all other project types. This may be due to the complexity of building projects and the large number of parties involved.

Table 5 shows that only 31% of all contractors made a profit of more than 10%. This implies that the contract price adjustment provisions, used to compensate contractors for rising costs, were not sufficient, as fifteen percent of the value of the work completed was excluded from escalation. This 15% is considered to be profit and other costs that should not escalate.

Table 6 shows the profitability of contractors per financial grade. It is interesting to note that the group of Grade 2 contractors, who are up-coming, small, and less experienced, made a loss on only 6% of their projects which is the same percentage as the performance for Grade 7 contractors (6%) and better than the performance of Grade 8 contractors (9%). Furthermore, the up-coming Grade 2 contractors made a good profit of more than 10% on 40% of all their projects which is better than the performance of any higher financially graded group of contractors.

Table 5

***Profitability of projects for different project types (2008)***

Profitability	% of Projects in each Project Type						% of all Projects
	Residential Building	Non-residential Building	Civil Work	Mechanical Work	Electrical Work	Special Work	
Loss	4	5	4	3	5	-	4
0 – 5%	32	29	20	23	20	14	22
6 – 10%	44	51	45	23	40	34	43
> 10%	20	15	31	51	35	52	31

Table 6

***Profitability of contractors per financial grade (2008)***

Profitability	% of Projects in each financial grade							
	2	3	4	5	6	7	8	9
Loss	6	1	3	2	3	6	9	4
0 - 5%	30	17	25	16	21	25	21	25
6 - 10%	24	59	38	47	48	42	38	35
> 10%	40	23	34	35	28	27	32	36
	2	3	4	5	6	7	8	9
	<b>Contractor financial grade</b>							

There is thus no relationship between profit and the financial grade of a contractor. There should be more emphasis on developing good small contractors, not only to achieve a larger financial grade, as small contractors can make just as good a profit as their larger and higher graded counterparts.

*Performance of the Employer and the Employer's Agents*

The contractors' satisfaction with the employer and agents (consultants) was tested with regard to overall performance, the quality of the tender documents and specifications, efficiency, openness and transparency of the contract procurement / adjudication processes followed, and the management of variation orders and claims. Table 7 shows the results obtained. The best overall employer categories were public corporations and public private partnerships with an average satisfaction level of 83% followed by provincial departments with 82%. The worst overall performance was achieved by the private sector and regional / district councils, with a satisfaction level of 79%. Bearing in mind that a score of 80% means satisfied, then the lowest score achieved is of no concern.

The average overall performance of the agents, in the eyes of the contractors, was slightly lower than the performance of the employers. The contractors were satisfied with the quality of the documentation and specifications, but the private sector and national departments received a slightly lower score of 78%, and regional / district councils the lowest score of 77%. The contractors were satisfied with the procurement / adjudication of the tenders.

The contractors' satisfaction levels were definitely lower for the management of variation orders (VO's) and claims. The national departments received the lowest scores of 73% for VO's and 71% for claims.

Table 7

***Contractors' level of satisfaction with the employer's and agent's performance (2008)***

	Satisfaction level %						
Employer Overall	79	83	80	82	80	79	83
Agent Overall	77	81	79	78	79	77	81
Documentation / Specifications	78	81	78	81	81	77	82
Procurement / Adjudication	82	82	83	83	83	81	83
Management of VO's	76	80	73	77	80	76	80
Management of claims	75	79	71	75	78	76	80
	Private Sector	Public Corporation	National Department	Provincial Department	Metropolitan Council	Regional / District Council	Public Private Partnership

To determine whether the contractors' financial grade played any role in the evaluation of the performance of the employer bodies and agents, Table 8 was created. It is interesting to note that



the higher grade contractors (7 to 9) were less satisfied than the Grade 2 to 6 contractors. The reason may be that the higher grade contractors are more sophisticated and expect more from their employers and their agents.

Table 8

**Contractors' level of satisfaction with the employer's and agent's performance per financial grade (2008)**

	Satisfaction level per contractor financial grade %							
Employer Overall	85	86	83	80	82	77	74	76
Agent Overall	83	83	82	80	82	75	68	67
Documentation / Specifications	86	86	81	80	84	77	71	70
Procurement / Adjudication	85	87	83	81	85	79	78	77
Management of VO's	89	80	80	77	82	73	66	68
Management of claims	80	80	78	78	80	70	68	68
	2	3	4	5	6	7	8	9
	<b>Contractor financial grade</b>							

Table 9 shows the contractors' levels of satisfaction with the employer bodies in different provinces. The number in brackets indicates the number of responses on which the average satisfaction level was based. The reliability of the data is lower for those employer bodies in provinces where only a few responses were received.

The contractors in the North West province were least satisfied with their metropolitan councils which received an average score of only 57%. This figure is based on responses received from three projects. Public corporations received the lowest scores in Limpopo (74%) and in the Northern Cape (73%). Gauteng Province was the national department with the least performance of 72%. The least performing provincial department was also Gauteng, with a score of 71%. The best performing national department was the Western Cape (90%), if the 100% score of the Northern Cape which is based on only one survey result, is ignored. The regional / district councils that received the lowest score of 73% were KwaZulu-Natal and the Northern Cape.

Table 9

***Contractors' level of satisfaction with the employer's overall performance per province (2008)***

Employer Category	Satisfaction Level %								
	Private Sector	88 (13)	78 (101)	77 (115)	85 (18)	85 (16)	83 (19)	77 (13)	78 (81)
Public Corporation	81 (9)	83 (66)	87 (33)	74 (13)	85 (32)	83 (10)	73 (6)	82 (23)	86 (14)
National Department	87 (3)	72 (13)	86 (12)	76 (5)	75 (6)	75 (8)	100 (1)	90 (8)	82 (11)
Provincial Department	88 (17)	71 (24)	84 (36)	76 (25)	89 (20)	95 (4)	85 (2)	84 (38)	77(27)
Metropolitan Council	80 (4)	83 (4)	85 (15)	90 (6)	75 (2)	57 (3)	70 (2)	76 (23)	80 (9)
Regional / District Council	80 (10)	79 (15)	73 (10)	93 (8)	79 (11)	77 (11)	73 (8)	83 (29)	75 (19)
Public Private Partnership	-	85 (4)	76 (5)	83 (6)	85 (4)	-	-	85 (6)	80 (3)
The value in brackets is the number of projects involved	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	Eastern Cape
	<b>Province</b>								

*Payment Delays*

The average number of days delay between certification and receipt of contractor payment of interim and final certificates is shown in Table 10.

With regard to early payment the national departments were the worst, with payments made within 30 days on only 37% of their projects. The best performing client categories with 62% and 54% of project payments made within a month were public private partnerships and metropolitan councils respectively. The different contract documents used for projects had different requirements regarding timeous payment of certificates, but payment within a month was considered to be reasonable. It is of great concern that only 42% of all contractors were paid on time (< 30 days). The worst performing employers were the national and provincial departments who paid 23% of their contractors only after three or more months.

Table 10

**Days delay between certification and payment (2008)**

Avg. Days Delay	% of Projects in each Employer Category							% of all Projects
≤ 14	9	3	10	8	5	7	24	8
14 to 30	29	38	27	31	49	40	38	34
30+ to 60	45	39	31	27	34	44	21	38
60+ to 90	12	14	9	11	5	4	7	10
90+ to 120	3	1	12	13	2	5	7	5
120+	2	5	11	10	5	-	3	5
	Private Sector	Public Corporation	National Department	Provincial Department	Metropolitan Council	Regional / District Council	Public Private Partnership	

Contractors refrain from standing up to their contractual right to be paid on time for fear of losing job opportunities in the future. This creates major cash flow problems for contractors and the cidb should communicate this with client bodies.

These payment results are also shown in Table 11 as timeous payment (< 30 days) by the employer bodies in different provinces. The results are disturbing as many employer bodies in various provinces pay only 0 to 20% of their contractors on time.

Table 11

**Timeous payment (< 30 days) of contractors per province and by employer categories (2008)**

Employer Category	% of Projects where contractor is paid within 30 days								
Private Sector	31 (13)	29 (101)	33 (115)	44 (18)	50 (16)	32 (19)	31 (13)	58 (83)	37 (41)
Public Corporation	33 (9)	42 (65)	58 (33)	15 (13)	41 (32)	80 (10)	0 (6)	26 (23)	50 (14)
National Department	0 (3)	62 (13)	58 (12)	20 (5)	0 (6)	13 (8)	100 (1)	50 (8)	27 (11)
Provincial Department	18 (17)	17 (24)	17 (36)	57 (23)	0 (20)	50 (4)	0 (2)	58 (38)	35 (26)
Metropolitan Council	75(4)	63 (40)	53 (15)	100 (6)	50 (2)	0 (3)	0 (2)	39 (23)	44 (9)
Regional / District Council	40 (10)	60 (15)	10 (10)	63 (8)	45 (11)	9 (11)	0 (8)	59 (29)	70 (19)
Public Private Partnership	-	50 (4)	80 (5)	67 (6)	25 (4)	-	-	83 (6)	33 (3)

The value in brackets is the number of projects involved	Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	Eastern Cape
	<b>Province</b>								

### *Performance of Materials Suppliers*

Contractors were requested to indicate their overall satisfaction level with their materials suppliers, the ability of the suppliers to keep to their quoted / agreed upon delivery schedules and whether the materials delivered on site complied with the specifications. The results are indicated in Table 12.

Only the materials suppliers of building projects received an overall performance score of slightly less than 80% (satisfied). The problem was their capability to stick to the agreed upon delivery schedules (77% to 78%) and not with the quality of the materials delivered, as the scores received for materials delivered as per specification were above 80%.

The materials suppliers' data was also evaluated in terms of the contractors' financial grade as indicated in Table 13. There is a tendency for the higher financially graded contractors ( 7 to 9) to be less satisfied with their materials suppliers' performance. Table 13 shows that the problem experienced was not with the quality (specification) of the materials, but with the delivery capability of the suppliers. Their projects were larger and it is likely that suppliers could not keep up with the larger orders placed. Table 14 shows the materials suppliers overall performance per province. The Western Cape is the province with the lowest score of 74%.

Table 12

#### ***Materials suppliers' performance (2008)***

<b>Contractors' Level of Satisfaction % with the Materials Suppliers for each Project Type</b>						
Overall Performance	78	79	81	81	83	85
Keep to agreed upon Delivery Schedule	77	78	80	80	81	84
Material delivered as per Specification	81	82	85	85	86	88
	Residential Building	Non-residential Building	Civil work	Mechanical Work	Electrical Work	Special Work

Table 13

**Materials suppliers' performance (2008)**

Contractors' Level of Satisfaction % with the Materials Suppliers per contractor financial grade								
Overall Performance	87	85	81	82	82	77	76	76
Keep to agreed upon Delivery Schedule	87	86	79	81	81	75	73	71
Material delivered as per Specification	90	88	85	86	85	80	81	78
	2	3	4	5	6	7	8	9
	<b>Contractor financial grade</b>							

Table 14

**Contractors' level of satisfaction with overall performance of materials suppliers per province (2008)**

81	78	81	83	81	83	83	74	80
Free State	Gauteng	KwaZulu-Natal	Limpopo	Mpumalanga	North West	Northern Cape	Western Cape	Eastern Cape
<b>Province</b>								

**Conclusions**

The main findings of the 2009 survey of contractors' opinions for projects completed in 2008 were as follows:

- 1) Contractors made a loss on 4% of all projects completed.
- 2) Mechanical work (51%) and special work projects (52%) showed the highest percentage of projects with contractor profit of > 10%.
- 3) There was no relationship between profit and the financial grade of contractors, as up-coming small contractors made just as good a profit as the higher graded contractors.
- 4) The overall performance of the majority of employer bodies was satisfactory ( $\geq 80\%$ ) but the agents received a slightly lower score.
- 5) The higher financially graded (7 - 9) contractors were less satisfied with the performance of their employers and agents.
- 6) Contractors were satisfied ( $\geq 80\%$ ) with the procurement / adjudication procedures followed, but the quality of the documentation / specifications received a slightly lower score.
- 7) The national departments received the lowest score for the management of variation orders (73%) and claims (71%).
- 8) Only 42% of all contractors were paid on time, within 30 days, with the national and provincial departments being the worst performers.
- 9) Contractors gave materials delivery for building projects the lowest score.
- 10) Higher financially graded contractors (7 - 9) were less satisfied with the delivery capabilities of their materials suppliers.

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