

# **Quality of talent development systems: results from an international study**

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**Abstract:** In this study a purpose-built framework for specifying quality criteria – structure, process and outcome – in talent development systems was developed and evaluated in an explorative international study. A standardized survey was conducted with 1020 survey participants from four nations (Australia, China, Germany and the USA) and four sports disciplines (athletics, gymnastics, swimming and volleyball). The overall response rate was 56.4%. The principal component analysis confirmed three out of the four determinants of the quality dimension structure (goals, resources, and opportunities). They were based on five to eleven items with a minimum factor loading of .51. For each of the dimensions process and outcome one factor with a minimum factor loading between .59 and .65 could be statistically confirmed. These findings suggest that the chosen conceptual framework is applicable for specifying quality criteria of talent development systems in different nations and sports. It can be used in further studies comparing the quality of sports systems between different nations and might be useful to develop a quality management approach for elite sport.

**Keywords:** quality assurance, quality management.

## **Introduction**

Over the past few years, quality management has been regarded as an important infrastructure tool for many business sectors (e.g. manufacturing, customer services, and health care) to succeed in their respective competitive environments (Dean & Bowen, 1994; Scott & Cole, 2000). In sport science, quality management approaches have been developed only in a few sub-domains – e.g. service quality (De Knop, Van Hoecke & De Bosscher, 2004; Kim & Kim, 1995) and physical activity for health (Hartmann & Opper, 2000). However, the issue of quality management has rarely emerged within the area of elite sport, particularly with respect to talent development (Birrer & Seiler, 1999; Green & Houlihan, 2005). The scarcity of scientific literature is surprising due to the large increase in its practical application. For example, as a tool for the improvement of elite level coaching services in the Australian Institute of Sports (see Fricker & Brockett, 2002). Other examples can be found in New Zealand and the UK (New Zealand Academy of Sport, 2003; Bailey & Morley, 2004).

Quality Management has been defined as

all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means such as quality planning, quality control, quality assurance and quality improvement within the quality system (EN ISO 8402, 1995).

As an important prerequisite for controlling, assuring, and improving the quality of a subject under consideration, its quality requirements or criteria have to be determined (quality planning)<sup>1</sup>. In elite level sport there have already been some attempts to define quality criteria (e.g. Birrer & Seiler, 1999; Oakley & Green, 2001; De Bosscher et al., 2008). Birrer and Seiler (1999) defined quality criteria for elite level coaching services in sports psychology, De Bosscher et al. (2008) for elite sports systems. De Bosscher et al. (2008) found nine pillars of elite sports systems, e.g. financial support, integrated approach to policy development, sport participation, athletic and post-career support, and training facilities. However, there is a lack of information on quality criteria for talent development systems.

### **Purpose of research**

The aim of the present exploratory international study was to develop an instrument for specifying quality criteria of talent development systems in elite sports and test it on its applicability in different circumstances. Furthermore, it aims to show if the conceptual framework might be used to compare the quality of talent development systems in different nations, as groundwork for deducing recommendations for further quality management steps like quality controlling, assuring, and improving. The current approach might be used as a frame of reference for future studies on the quality of talent development in elite sports.

### **Conceptual framework – quality of talent development systems**

*Quality* is a “totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs” (EN ISO 8402, 1995). Thus, quality has been defined as meeting and/or exceeding expectations (Reeves & Bednar, 1994). To determine quality criteria for talent development systems, the approach of Donabedian (1980) was used. Originally developed and applied for quality assessment, monitoring, and improvement of medical care systems, Donabedian (1980) introduced three quality dimensions: structure, process, and outcome. *Structure* describes the physical, organizational, and other characteristics of an entity like the talent development system and its environment. *Process* describes what is actually performed, here: developing talent. *Outcome* summarizes the achievements of the system, or, in the terms of this study, the final result of the developed athletic talent. This approach has been successfully applied to different areas like public health (Handler, Issel & Turnack, 2001), industrial

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1 Quality planning: “Activities that establish the objectives and requirements for quality and for the application of quality system elements” (EN ISO 8402, 1995).

service (Homburg & Garbe, 1999), and elite sport (Birrner & Seiler, 1999). Birrner and Seiler (1999) used the three quality dimensions of Donabedian (1980) for the operationalization of the quality of sport psychology services in elite sport, but without systematically testing their applicability.

### Structure

To further specify the structure of talent development systems, von Wright's logical model of events (1976) was used. This model has been previously applied in an international comparative analysis of health promotion systems where organizations within the sport system have been included that are concerned with the promotion of physical activity (Rütten et al., 2003). Von Wright's model (1976) offers a general logic of action explaining individual and collective (organizational or system) behaviour by four structural determinants: goals, resources, obligations, and opportunities. Assigned to talent development systems, *goals* consider their formal characteristics like their concreteness and specification in written form. *Resources* describe the capability of the system, i.e. personnel, infrastructural, and financial resources. *Obligations* were not only related to the personal and professional duties of the officials and coaches, but also to the institutional arrangements of the talent development system. *Opportunities* refer to "windows of opportunity" that talent development systems might experience. They can result from changes in the talent development system (e.g. new decision structures; internally) and in the inter-organizational settings (e.g. new support from schools or economic support; externally).

### Process

*Process* was defined as activities that occurred between the people involved in talent development. The activities consisted of three determinants: planning, implementation, and control. *Planning* involves the master plan of talent development and the consideration of new scientific insights. *Implementation* includes different methods of carrying out talent development programmes and refers to the actual performance of training or the size of training groups. *Control* involved the procedures for auditing talent development programmes.

### Outcome

International success at the World Championships or the Olympic Games was generally considered the ultimate goal of talent development. However, from a quality management point of view, outcome can be characterized by the satisfaction of the protagonists. Consequently, outcome in the present context focused on the assessment of the system and its achievements by its participants (officials, coaches, and athletes).

## Methods

### Participants

For testing the purpose-built framework on applicability, officials, coaches, and athletes from four of the “top-ten nations” of the Summer Olympic Games in Sydney 2000<sup>2</sup> (Australia, China, Germany, and the USA) on three inquiry levels (national, state, and local) and in four disciplines (gymnastics, swimming, track and field, and volleyball) were included. These sports were selected because of their Olympic representation, their popularity, and because they require different physical demands.

Participants were chosen using a convenience sample. A core group of people in the talent development systems from each of these countries was qualitatively interviewed and asked for further contacts that fit the correct population description. To ensure the comparability of study participants across the nations, different guidelines were established based on the German system. With respect to the *officials*, five groups of organizations were chosen on all three inquiry levels: federal organizations responsible for elite level sports (e.g. in Germany the Ministry for Internal Affairs), non-governmental umbrella sports organizations (e.g. in the USA the United States Olympic Committee), sport specific non-governmental sports organizations (e.g. in Australia the National Sporting Organizations), educational organizations (e.g. in the USA the National Collegiate Athletics Association), and scientific organizations (e.g. the National Institute for Sport Science in Germany). *Coaches* at the national level had athletes taking part in international senior championships, at the state level they were working with athletes taking part in national and international youth championships and at the local level they had athletes who did not belong to national or state level squads, but competed at the two highest leagues in their respective nations. Finally, *athletes* older than 12 years in the above mentioned levels were included. For every nation, 75 study participants were included with respect to one sport (see Table 1). A total of 255<sup>3</sup> participants from each nation were included in the study.

Table 1. Sampling procedure in Germany for one sport.

	Officials	Coaches	Athletes	n (total)
National level	n=5	n=2	n=20	n=27
State level	n=5	n=2	n=15	n=22
Local level	n=8	n=8	n=10	n=26
n (total)	n=18	n=12	n=45	n=75

2 Data were selected between the Olympic Summer Games of Sydney 2000 and Athens 2004.

3 There is a reduction of 45 survey participants ( $75 \times 4$  sports = 300 survey participants), because only officials from the sport specific non-governmental organizations were represented in each of the four sports whereas officials from the other groups (e.g. non-governmental umbrella organizations) had superordinate functions.

## Measures and procedures

A standardized survey was carried out all for data gathering. The questionnaire included items from the quality dimensions of talent development: structure, process, and outcome. The survey questionnaire involved a five-point Likert scale.<sup>4</sup> It was originally developed on the basis of qualitative interviews that were carried out previously with officials, coaches, and athletes from the four nations and was evaluated by experts in the fields of talent development as well as questionnaire development prior to the final draft. The questionnaire was initially developed in the German language. The original German version was used as the master draft and then translated into English and Chinese. According to the approach of the IPAQ<sup>5</sup> group, a forward-backward-translation was used (IPAQ, w. y.). The different translations were reviewed, discussed and if necessary revised. A pre-test of the questionnaire showed that it was understandable for officials, coaches and athletes. In some cases, explanatory examples were added. Officials, coaches, and athletes received nearly the same questionnaire. Only personal data questions differed slightly. Officials and coaches answered the standardized questionnaire via telephone interviews and the athletes in written form.

## Response rate

The overall response rate was 56.4%.<sup>6</sup> Compared with other international comparative surveys, this result can be characterized as good (Rütten et al., 2003, 51). There were some problems with the response rate in China (38.6%) mainly related to the outbreak of SARS<sup>7</sup> that occurred when the fieldwork was carried out. For this reason, a planned journey to China for data gathering had to be cancelled.

## Data analysis

For specification of quality criteria, reliability tests (cronbach's alpha) followed by factor analysis (rotation: varimax) were used. For inter-country comparison of talent development systems with respect to structural quality determinant resources, an analysis of variance was used. Furthermore, procedures of descriptive statistics were applied for data analysis in this study.

## Participant characteristics

Table 2 contains the descriptive characteristics of the participants concerning age and sex for all the officials, coaches, and athletes from the different nations. Only the athletes showed a significant difference between the survey nations regarding their age

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4 1 = doesn't apply at all; 5 = does totally apply; respectively 1 = worsened a lot; 5 = improved a lot for quality determinant opportunities.

5 IPAQ = International Physical Activity Questionnaire.

6 Response rate for different nations: Australia: 59.8%; China: 38.6%; Germany: 82.1%; USA: 44.3%.

7 SARS = Severe Acute Respiratory Syndrome.

( $F = 4.11$ ;  $p = 0.007$ ). More specifically, the mean age of China athletes differed from those of their USA counterparts ( $p = 0.008$ ).

Table 2. Participant characteristics.

Officials	Australia		China		Germany		USA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	42.54	9.07	40.56	2.65	49.04	9.59	45.91	8.62
	m	f	m	f	m	f	m	f
Sex	14	12	5	4	23	5	15	8
	(53.8%)	(46.2%)	(55.6%)	(44.4%)	(82.1%)	(17.9%)	(65.2%)	(34.8%)
Coaches	Australia		China		Germany		USA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	41.85	11.19	41.81	8.16	46.14	10.70	42.88	9.94
	m	f	m	f	m	f	m	f
Sex	21	19	21	5	40	3	20	6
	(52.5%)	(47.5%)	(80.8%)	(19.2%)	(93.0%)	(0.7%)	(76.9%)	(23.1%)
Athletes	Australia		China		Germany		USA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	18.51	4.16	20.73	5.90	18.71	5.14	17.44	5.08
	m	f	m	f	m	f	m	f
Sex	48	47	52	10	89	54	17	47
	(50.5%)	(49.5%)	(83.9%)	(16.1%)	(62.2%)	(37.8%)	(26.6%)	(73.4%)

## Results

### Specification of quality criteria of talent development systems

The factor analysis (rotation: varimax) determined that three determinants for the *structure* dimension were confirmed<sup>8</sup> statistically. The determinants were based on five to 11 items with a minimum factor loading of .51. There were only a few double loadings. Internal consistence of the factors ranged from  $\alpha = .79$  to  $\alpha = .88$ . In summary, 34.8% of the variance could be accounted for by these three factors, with *resources* (13.9%) constituting the largest proportion and *goals* the smallest (10.1%) (Table 3). With respect to the dimension *process*, only one factor (*planning*) could be statistically confirmed. Factor loadings ranged between .59 and .78 with an internal reliability of  $\alpha = .88$ . The entire *process* factor accounted for 38.1% of the variance. For the dimension *outcome*, only one factor proved to be significant. Factor loadings reached a minimum of .65 with an internal reliability of  $\alpha = .88$  with an explained variance of 48.4% (Table 4).

8 Structural determinant obligation is only based on two factors and therefore could not be confirmed.

Table 3. Principal component analysis of items indicating structural determinants of the quality of talent development (varimax rotated) (loadings under .40 were omitted)

<b>Scales (Cronbach's Alphas)</b>	<b>Scales</b>			
<b>Items</b>	<b>Goals</b>	<b>Resources</b>	<b>Opportunities</b>	<b>Obligations</b>
<b>1. Goals (<math>\alpha = .79</math>)</b>				
There are very concrete goals	.77			
Goals are set on a long term basis	.70			
The goals are known to all	.67			
The goals are defined in writing	.68			
Dropping out (athletes leaving the sport) should be avoided	.52			
<b>2. Resources (<math>\alpha = .88</math>)</b>				
There is enough co-operation between schools and sports clubs		.62		
There is enough support for competitive sports in schools		.52		
There are enough boarding schools for sport		.54		
There is enough support for talent within the framework of professional training		.58		
The available resources are sufficient		.66		
There are enough support services within the framework of talent development		.51		
There are enough full-time coaches		.72		
There are enough coaches		.67		
There is enough support for athletes within the framework of college education		.60		
There are enough training centers		.61		
There are enough training camps		.64		
<b>3. Opportunities (<math>\alpha = .83</math>)</b>				
Support from top politicians			.52	.45
Economic support			.62	
Support of the population			.68	
Media support			.56	
Co-operation between sports officials and politics			.51	.46
Amount of talent coming from other types of sports			.55	
Amount of talents			.69	
Support from parents			.54	
Scientific support			.58	
<b>4. Obligations (<math>\alpha = .69</math>)</b>				
The feds intervene too much in talent development				.66
The associations make too many regulations in relation to talent development				.58
Eigenvalue	<b>5,64</b>	<b>6,93</b>	<b>5,64</b>	<b>3,12</b>
% of variance	<b>10,14</b>	<b>13,60</b>	<b>11,05</b>	<b>6,12</b>

Table 4. Principal component analysis of items indicating processual and outcome determinants of the quality of talent development (varimax rotated) (loadings under .40 were omitted)

<b>Scales (Cronbach's Alphas)</b>	<b>Scales</b>
Items	<b>Process</b>
<b>Process (<math>\alpha = .88</math>)</b>	
Systematic planning is taking place	.76
Master plans are taken into consideration as a basis for training	.78
New scientific insights are being taken into consideration	.72
The master plan is scientifically up to date	.73
Training is sufficiently documented	.69
There are talent development programs	.66
Training is well organized	.71
Training content is comprehensible	.71
Training is adapted to the individual	.59
Training is organized very diversified	.62
Eigenvalue	<b>5,33</b>
<b>% of Variance</b>	<b>38,09</b>
<b>Outcome</b>	
<b>Outcome (<math>\alpha = .84</math>)</b>	
Much success is achieved through talent development	.67
Only some talents drop out	.65
Enough talent is developed	.72
We are successful in professional sport through talent development	.76
We are successful in professional sport	.71
Officially set goals of talent development are met	.78
Outlay and outcome are appropriately related concerning talent development	.73
Eigenvalue	<b>3,88</b>
<b>% of Variance</b>	<b>48,43</b>

### Inter-country comparison of talent development systems

Table 5 shows selected international comparative results with respect to the structural quality determinant *resources*.

Table 5. Mean and standard deviation (SD) of the assessment of quality of resources or talent development in different nations (\* $p < 0.05$ , \*\* $p < 0.01$ , and \*\*\* $p < 0.001$ )

	Australia n=90		China n=74		Germany n=99		USA n=71		F
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Support for competitive sport in schools	2.93	1.09	3.38	0.90	2.32	1.01	3.15	1.09	17.26***
Support services for athletes	3.30	1.12	3.58	0.99	2.93	0.97	3.10	1.02	6.20***
Quantity of Full time coaches	2.61	1.25	3.96	0.71	2.47	1.06	3.03	1.04	32.89***



China showed a higher rating for the determinant resources than any other nation (Table 5). There were statistical significant differences for “support for competitive sport in schools” ( $p < 0.001$ ) in China ( $3.38 \pm 0.90$ ) relative to Germany ( $2.32 \pm 1.01$ ). Additionally, the situation regarding “support services for athletes” was rated higher in China ( $3.58 \pm 0.99$ ) than in Germany ( $2.93 \pm 0.97$ ) ( $p < 0.001$ ) and the USA ( $p = 0.048$ ). With respect to the “quantity of full-time coaches” there are statistical significant differences between China ( $3.96 \pm 0.71$ ) and any other nation (Australia:  $2.61 \pm 1.25$ ; Germany:  $2.47 \pm 1.06$ ; USA:  $3.03 \pm 1.04$ ) (result for all nations:  $p < 0.001$ ).

With respect to resources for talent development, the USA was ranked second behind China. The determinants “support for competitive sport in schools” (SCSS) ( $p < 0.001$ ) and “quantity of full-time coaches” (QFTC) ( $p = 0.01$ ) were found to be better in the USA (SCSS:  $3.15 \pm 1.09$  and QFTC:  $3.03 \pm 1.04$ ) relative to Germany (SCSS:  $2.32 \pm 1.01$  and QFTC:  $2.47 \pm 1.06$ ). The determinant “support for competitive sport in schools” ( $p < 0.001$ ) was rated significantly higher in Australia ( $2.93 \pm 1.09$ ) relative to Germany ( $2.32 \pm 1.01$ ).

## Discussion

The study used a standardized survey including officials, coaches and athletes from four nations (Australia, China, Germany and the USA) and four sport disciplines (athletics, gymnastics, swimming and volleyball) to test a conceptual framework for specifying quality criteria for talent development systems in elite sports.

The primary finding of the principal component analysis was that three out of the four determinants of the quality dimension *structure* (*goals*, *resources*, and *opportunities*) could be confirmed by principal component analysis. Also one factor was found for both quality dimensions *process* and *outcome*. These findings suggest that the existing conceptual framework is applicable for specifying quality criteria for talent development systems in different nations and sports.

Similar quality dimensions and determinants were identified in other studies. De Bosscher et al. (2008) defined determinants for success of elite sports systems and found nine pillars comparable to some indicators of this study: financial support, integrated approach to policy development, sport participation, talent identification and development, athletic and post career support, training facilities, coaching provision and coach development, national and international competitions, and scientific research and divided them into input (financial support) and throughput (remaining determinants). Similar to this investigation, Homburg and Garbe (1999) used the approach of Donabedian for the identification of quality criteria for industrial services and found comparable determinants – i.e. for structural quality the qualification of the service personnel, and for process-related quality the consideration of the interests of the individual client. In addition, determinants identified by Brady (1997) and Chang and Chelladurai (2003) for measuring sport service quality and by Birrer and Seiler (1999) for defining the quality of sport psychology services in elite sport might be related to the results of this study.

The interpretation of the results presented in this study yields valuable information for determining the quality of talent development systems in different nations and sports. The exemplary international comparison for the structural quality determinant resources gives a first impression of the potential of the presented framework. Based on this tool, the quality of structural, process- and outcome-related determinants of talent development systems in different nations and sports could be determined and compared – as an important precondition for further quality management steps like quality controlling, assuring, and improving. Furthermore, there might be a large amount to be learned from quality standards already implemented in other, possibly more successful, nations. An international comparative regression analysis for determining the influencing structural and process-related factors on talent development outcome was presented before and showed high predictive power of the model (Röger, Rütten & Ziemainz, 2005). As the final outcomes of talent development, this study involved subjective ratings from the survey participants. However, further investigations might include more objective data (like for example the ranking of the top-ten nations in form of the number of medals; e.g. Athens 2008: 1. USA, 2. China, 3. Russia, 4. Australia, 5. Japan, 6. Germany, 7. France, 8. Italy, 9. South Korea, 10. Great Britain) for the validation of outcome data. Although data analysis Röger et al. (2005) show that in this study the subjective ranking of the outcome was comparable to the medal ranking of the Olympic Games in Athens 2008, as the study participants in the USA had higher outcome ratings than those in Australia, followed by Germany. The exception was China where outcome was subjectively rated higher than in the USA.

We acknowledge that besides the advantage of the international comparative approach used in this study in testing the conceptual framework on applicability across different nations and sport systems, there are also some disadvantages to this approach (Brettschneider, Brandl-Bredenbeck & Rees, 1996; Harkness, van de Vijver & Mohler, 2002). According to Brettschneider et al. (1996), the main problem with international comparative studies is the validity of different aspects like function, sampling, and instrument (questionnaire). In this study, function referred to validity of the respective participant categories, or the selected institutions and persons for the survey. Hence, to ensure comparability, the selection of officials, coaches and athletes in each nation was made on the basis of the German system. Each national system, however, is different and thus generalizations had to be made. To ensure that the questionnaire was valid, a number of measures were taken. First, native speakers from the respective nations were included in the development of the questionnaire. Second, a forward-backward-translation method for translating the questionnaire into English and Chinese was used (see IPAQ, w.y.). Regardless of the effort that went into the translation, it is possible that the original meaning of some of the questions could have been modified. Furthermore, international comparative studies have consistently suffered from small sample sizes. This issue arises because when nations were taken as units of analysis, the number available for study was quite limited (Goldthorpe, 1997). The small sample size issue (with respect to the number of included nations) was not solved within this study and thus must be taken into account.

The current study evaluated a new model for specifying quality criteria in the area of talent development within elite sport. With the study limitations in mind, the results must be interpreted as preliminary. Moreover, conclusions for possible improvement must be tested in further studies. This exploratory study presents an applicable tool for future studies investigating the quality of talent development approaches in different nations.

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