

# The efficiency of judo techniques in the light of amendments to the rules of a sports contest

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## Summary

**Introduction.** In 2009 and 2010 very significant amendments to sports rules of the contest judo were introduced. The aim of these changes was to make judo sport contests more appealing and to eliminate or limit performing technical elements which came from outside the accepted classification of judo techniques.

**Material and methods.** The material consisted of an analysis of fights of men's judo representatives recorded by audio-visual means during the Olympic Games in 2008, 2012 the World Championships in 2009, 2010, 2011. The fights were converted by means of a graphic method and then analysed. The most efficient teams, dominant techniques, the efficiency of groups of techniques and the scope of administered penalties were determined.

**Results.** In 2008 the most efficient men's judo team was from Korea, in 2010-2011 from Japan and in 2012 from Russia. In 2008, 2009 and 2012, hand throws were the most efficient techniques and in 2010 and 2011 leg throws. During the 2008 Olympic Games sumi gaeshi was the most dominant throw. In the other competitions (2009-2012) the most dominant throw was seoi nage.

**Conclusions.** In 2010 and 2011, the efficiency of hand techniques has diminished while the efficiency of leg techniques has grown. In 2012 the efficiency of all throwing techniques has declined. The number of points granted for judges' penalties has also fallen.

## Introduction

For many years there has been a need to implement amendments to rules of a sports contest, which would lead to enhancing the meeting. This is connected with a better understanding of rivalry in particular sports as well as with increasing ratings in the media in order to raise funds. Also for a number of years this has been a subject of many discussions and consultations in the judo environment. The competitors' greatly stooped posture during the fight who were permanently performing moves aiming at getting hold of their opponents' legs or trousers was not an attractive show. This resulted in introducing amendments in sports rules and in organization of competitions (<http://www.ijf.org/> and <http://www.eju.net/>). The most essential changes in 2009 comprised withdrawing of the „Koka”, the lowest judges' mark, for an efficient execution of the technique, limiting throws consisting in getting hold of trouser legs, and organising the World Championships every year (from 1965 to 2009 the WCh in judo were organised every two years). In 2010 execution of throws which relied on

direct catching the opponent's legs, such as morote gari, kuchiki taoshi, kibisu gaeshi, kata guruma, sukui nage, kata otoshi, was limited. These throws can now be applied in a sports competition only in form of connections with other techniques and in form of counter-attacks. Shortening the time of repechage fights, allowing two competitors from one country in every weight category in the World Championships and seeding competitors based on ranking lists has changed the principles of sports rivalry. The subject of research presented in this paper was to determine the influence of the implemented changes on results of male judo representatives and on the efficiency of techniques applied during the competition.

## Material and methods

The research material consisted of recorded fights during the Olympic Games in Beijing in 2008 (269 fights which were fought by 230 competitors from 81 countries were recorded), the World Championships in Rotterdam in 2009 (327 fights fought by 334 competitors from 96 countries were recorded),

the World Championships in Tokyo in 2010 (484 fights fought by 527 competitors from 105 countries were recorded) and the World Championships in Paris in 2011 (524 fights fought by 510 competitors from 122 countries were recorded) and the Olympic Games in London in 2012 (250 fights fought by 233 competitors from 109 countries were analysed).

Competitors participating in the group of men were subject to observation. The fights were recorded with the help of standard audio-visual means, and next the footage was subjected to a graphic registration [1]. The analysis of material included fights in seven weight categories, without the open category (included in the program of 2010 WCh). The starting efficiency of national teams participating in the above mentioned competitions and the dominant techniques were determined based on three classification criteria, where the lower value of the "K" index decided about the subsequent positions.

$$k = k1 + k2 + k3$$

Starting efficiency of national teams:

k1. Values of won medals.

k2. Sums of points granted for taken places (1<sup>st</sup> place – 9, 2<sup>nd</sup> place – 5, 3<sup>rd</sup> place – 3, 5<sup>th</sup> place – 1 point)

k3. Numbers of points falling to one representative of the country.

The dominant techniques were determined based on three criteria:

K1. Numbers of attacks evaluated as ippon, next waza ari, yuko (and koka only in 2008 OG)

K2. Numbers of all efficient attacks which received judges' marks.

K3. The average of the number of judges' points (ippon, waza ari, yuko, koka) received for the technique in one fight.

The efficiency of attack by single techniques and classification groups of judo techniques was expressed with an average number of judges' points granted for efficient attacks scored on average in one fight.

The value of indices of efficiency in attack (Sa) was a number of points received for efficient execution of the technique per one fight.

$$Sa = 3xM + 5xM + 7xM + 10xM / n$$

M – number of efficient attacks

n – number of analysed fights

3 pts. – koka, 5 pts. – yuko, 7 pts. – waza ari, 10 pts. – ippon – this was the way in which support points (judicial) were marked for efficient attacks in judo.

The efficiency of judges' penalties administered during the above mentioned competitions was determined as the efficiency of attack (Sa) substituting negative values of received judges' penalties in place of efficient attacks:

– 3 pts. = shido, – 5 pts. = 2 shido, – 7 pts. = 3 shido, – 10 pts. = 4 shido (hansoku make – disqualification).

The classification of groups of techniques was based on Kodokan Judo [2-3]. The spelling and names of judo techniques were presented according to the English-Japanese Kodokan dictionary [4].

## Results

During the Olympic Games in 2008 representatives of Korea demonstrated the greatest efficiency even though representatives of Japan took a higher place in the medal table. In the following World Championships (in 2009) representatives of Korea clearly dominated before Russian representatives. After implementing amendments to sports rules of the judo contest in the two subsequent World Championships representatives of Japan dominated in all three classification criteria (k1, k2, k3); however, during the London Olympic Games in 2012 representatives of Russia exhibited the greatest efficiency (Tab. 1).

During the WCh in years 2009-2011 the most efficient techniques were seoi nage and uchimata throws, which along with the ouchi gari throw and with the kesa gatame hold are recurrent in the first ten dominant techniques in all competitions analysed in the paper. During the OG in 2012 seoi nage was the dominating technique, followed by kesa gatame. After implementing amendments to sports rules (since 2010), the kuchiki taoshi throw has disappeared from the first ten

Tab. 1. Starting efficiency of male representatives participating in the Olympic Games in 2008 in the World Championships in 2009, 2010, 2011 and Olympic Games 2012

K	1	2	3	4	5	6	7	7	9	10
k1-k2-k3	2-1-3	1-2-4	3-3-5	4-4-8	4-5-7	4-6-6	7-6-9	7-6-9	9-12-1	9-12-10
<b>OG 2008</b>	<b>KOR</b>	<b>JPN</b>	<b>AZE</b>	<b>GEO</b>	<b>MGL</b>	<b>GER</b>	<b>UZB</b>	<b>FRA</b>	<b>AUT</b>	<b>KAZ</b>
K	1	2	3	3	5	5	7	8	9	10-10
k1-k2-k3	1-1-1	2-2-2	3-3-4	3-3-4	3-5-6	3-5-6	8-11-3	7-7-12	8-8-10	8-11-8
<b>WCh 2009*</b>	<b>KOR</b>	<b>RUS</b>	<b>UKR</b>	<b>KAZ</b>	<b>FRA</b>	<b>MGL</b>	<b>PRK</b>	<b>JPN</b>	<b>ESP</b>	<b>BLR-CUB</b>
K	1	2	3	4	5	6	7	8	9	10
k1-k2-k3	1-1-1	2-2-4	4-3-6	4-7-2	3-4-7	6-4-5	6-6-3	9-10-9	10-8-10	11-11-7
<b>WCh 2010*</b>	<b>JPN</b>	<b>FRA</b>	<b>UZB</b>	<b>GRE</b>	<b>KOR</b>	<b>BRA</b>	<b>NED</b>	<b>GER</b>	<b>RUS</b>	<b>AZE</b>
K	1	2	3	4	5	6	7	8	9	10
k1-k2-k3	1-1-1	2-2-4	2-3-5	4-4-6	6-6-2	4-5-7	7-7-8	8-11-3	8-9-9	8-9-11
<b>WCh 2011</b>	<b>JPN</b>	<b>KOR</b>	<b>RUS</b>	<b>FRA</b>	<b>GRE</b>	<b>UZB</b>	<b>BRA</b>	<b>MNE</b>	<b>NED</b>	<b>GER</b>
K	1	2	3	4	5	6	7	8	9	10
k1-k2-k3	1-1-1	2-2-2	5-3-4	3-4-6	6-5-7	4-6-9	7-7-5	8-9-8	8-9-10	11-13-3
<b>OG 2012</b>	<b>RUS</b>	<b>KOR</b>	<b>JPN</b>	<b>FRA</b>	<b>GER</b>	<b>GEO</b>	<b>MGL</b>	<b>CUB</b>	<b>HUN</b>	<b>GRE</b>

\*Adam et al. 2011

dominant techniques, and the kouchi gari throw has appeared. During the WCh in 2011 and the OG in 2012 the sode tsurikomi goshi throw and the juji gatame armlock appeared in the first ten dominant techniques, and the sumi gaeshi throw disappeared (Tab. 2 and 3).

The efficiency of penalties is significantly reduced both in values of the Sa index and in their meaning in percentage values of subsequent competitions. The increase in the percentage signif-

icance of throws and grappling holds has not resulted in a significant way in an increase in their efficiency (Sa) (Tab. 4).

After 2009 there has been a reduction in the efficiency (Sa) and in the percentage significance of hand throws (te waza), whereas these indices increase in leg and hip groups of throws (ashi waza and koshi waza). The efficiency of „sacrifice” throws (sutemi waza) remains at a steady level (Tab. 5). Especially between 2009 and 2010 a distinct growth in the

Tab. 2. Techniques dominating during the 2008 OG and the 2009 WCh

2008 Olympic Games					2009 World Championships*				
K	Technique	K1	K2	K3	K	Technique	K1	K2	K3
1	Sumi gaeshi	2	1	1	1	Seoi nage	1	1	1
2	Sukui nage	3	1	2	2	Uchimata	2	3	3
3	Seoi nage	1	4	3	3	Kuchiki taoshi	5	2	2
4	Uchimata	4	3	5	4	Kosoto gari	3	3	4
5	Kata guruma	5	5	4	5	Sumi gaeshi	4	5	5
6	Kuchiki taoshi	9	6	6	6	Kesa gatame	6	6	6
7	Ouchi gari	11	6	7	7	Sukui nage	7	6	7
8	Kesa gatame	10	8	8	8	Osoto gari	8	8	8
9	Yoko shiho gatame	6	14	10	9	Ouchi gari	9	9	9
10	Kosoto gari	13	10	9	10	Tani otoshi	10	10	16

\* Adam et al.2011

Tab. 3. Techniques dominating during the WCh in 2010, 2011 and OG 2012

2010 World Championships*					2011 World Championships					2012 Olympic Games				
K	Technique	K1	K2	K3	K	Technique	K1	K2	K3	K	Technique	K1	K2	K3
1	Seoi nage	1	1	1	1	Seoi nage	1	1	1	1	Seoi nage	1	1	1
2	Uchimata	1	2	2	2	Uchimata	2	2	2	2	Kuzure kesa gatame	2	2	2
3	Osoto gari	3	3	3	3	Sode tsurikomi goshi	5	4	3	3	Tai otoshi	5	4	3
4	Kouchi gari	4	4	5	4	Ouchi gari	7	3	4	4	Juji gatame	3	8	6
5	Ouchi gari	9	5	4	5	Kesa gatame	3	6	6	4	Okuri eri jime	3	8	6
6	Uki waza	7	6	6	6	Osoto gari	8	4	5	6	Uchimata	8	5	4
7	Tani otoshi	6	7	7	7	Sukui nage	9	6	7	7	Sukui nage	6	7	9
8	Kesa gatame	4	10	8	8	Kouchi gari	10	6	8	8	Sode tsurikomi goshi	10	5	8
9	Sumi gaeshi	10	7	9	9	Juji gatame	4	14	10	9	Osoto gari	7	12	10
10	Tai otoshi	8	9	10	10	Kosoto gari	11	9	9	10	Uki waza	11	11	11

\*Adam et al.2011

Tab. 4. The efficiency of throws, holds and penalties (Sa/) of the OG participants in 2008 the WCh in 2009-2011 and OG 2012

Techniques and penalties	OG – 2008	WCh – 2009*	WCh – 2010*	WCh – 2011	OG - 2012
Nage waza	7,409	8,731	8,678	8,287	5,960
Katame waza	1,234	1,190	1,295	1,516	1,736
Sa (nage+katame)	8,643	9,921	9,973	9,803	7,696
Penalties	4,680	5,373	3,295	2,670	1,840
Total Sa	13,323	15,294	13,268	12,473	9,536

\* Adam et al.2011

Tab. 5. The efficiency of groups of throws (Sa) among participants of the 2008 OG the WCh 2009-2011 and OG 2012

Groups of throws	OG – 2008	WCh – 2009*	WCh – 2010*	WCh – 2011	OG - 2012
Te waza	2,888	3,462	2,225	2,594	2,352
Koshi waza	0,484	0,483	0,694	0,823	0,708
Ashi waza	2,037	2,575	3,502	3,065	1,620
Sutemi waza	2,000	2,211	2,257	1,805	1,280
Total Sa	7,409	8,731	8,678	8,287	5,960

\*Adam i wsp.2011

Tab. 6. The efficiency of groups of grappling holds (Sa) among 2008 OG the WCh of 2009-2011 and OG 2012 participants

Groups of grappling holds	OG – 2008	WCh – 2009*	WCh – 2010*	WCh – 2011	OG - 2012
Osaekomi waza	1.086	0.853	0.882	0.906	1.016
Shime waza	0.074	0.214	0.186	0.305	0.360
Kansetsu waza	0.074	0.123	0.227	0.305	0.360
Total Sa	1.234	1.190	1.295	1.516	1.736

\*Adam et al.2011

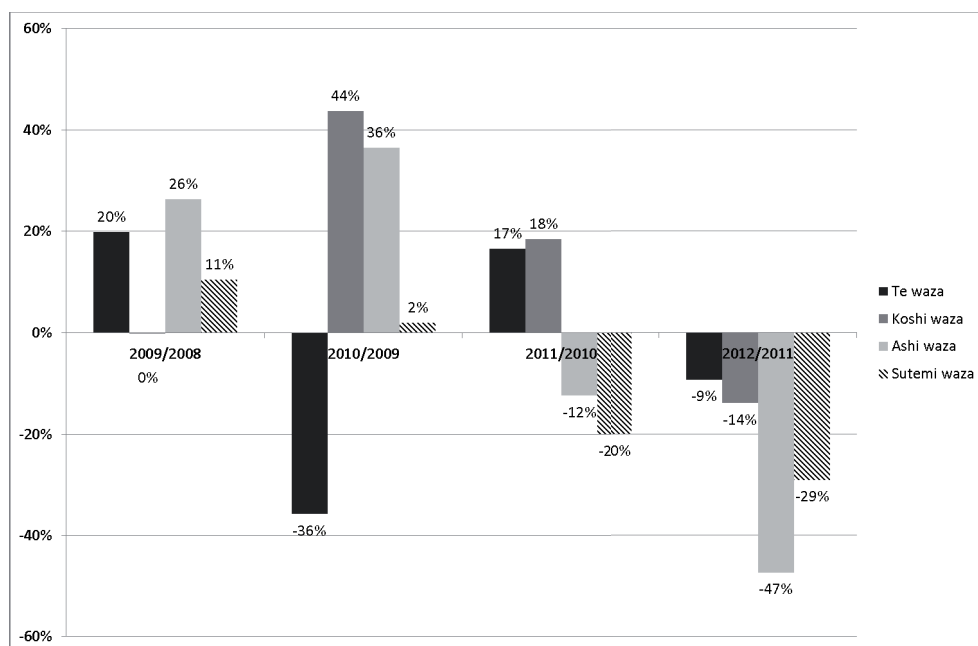


Fig. 1. A relative chain increase in the efficiency of groups of throws among 2008 OG the WCh of 2009-2011 and 2012 OG participants

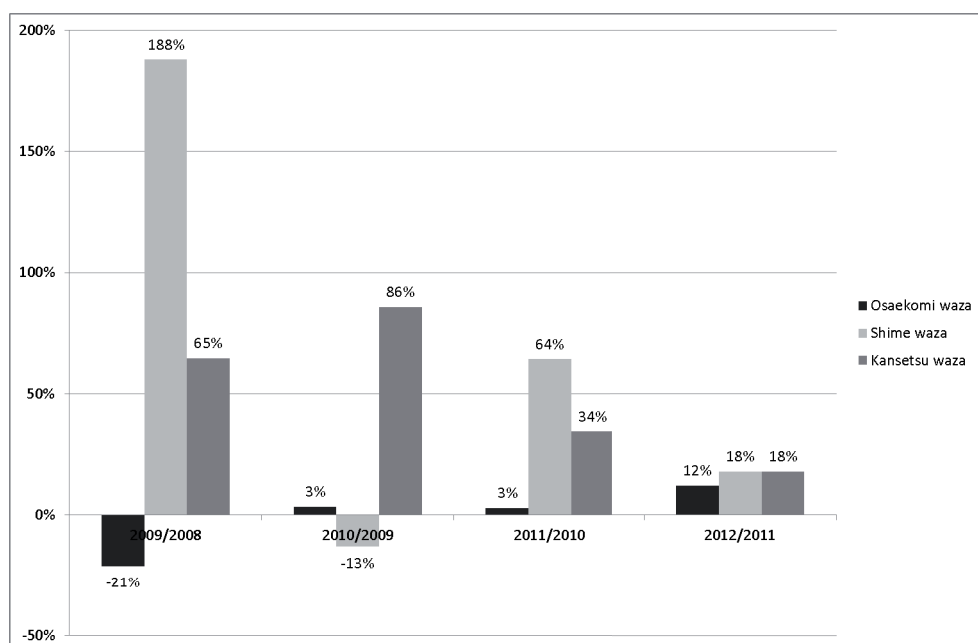


Fig. 2. A relative chain increase in the efficiency of groups of grappling holds among 2008 OG the WCh of 2009-2011 and 2012 OG participants

efficiency of koshi waza (almost half as high) and by over 1/3 of ashi waza is noticeable (Tab. 6).

In the group of grappling holds (katame waza) there is an increase in the efficiency of the armlock (kansetsu waza) and the choking (shime waza), while grappling holds (osaekomi waza) remain at a similar level of efficiency, and their percentage value with reference to holds and judges' penalties decreases (Fig. 1). The highest rise in the efficiency of choking (almost twice as much) can be noticed between years 2008 and 2009 (Fig. 2)

## Discussion

The research has shown an improvement in the starting efficiency of male representatives of Japan during the World Championships in 2010 and 2011 and an increase in the efficiency of the Russian team during the Olympic Games in London in 2012 – following the implementation of amendments to sports rules of the judo contest. In these years also a significant reduction of the value of judges' penalties and the efficiency of te waza throws (hand throws) took place with a simultaneous increase in the efficiency of throws from the ashi waza group (leg throws). A return to the style of the fight took place where attacks with leg throws, such as uchimata, osoto gari, ouchi gari and kouchi gari, kosoto gari etc. were frequent and efficient, even though the seoi nage throw remains the most dominant technique. [5].

Hand throwing techniques consisting in grappling the opponent's legs were assigned to different forms of wrestling and regional matches. These throws were efficiently executed by competitors of wrestling, samba, jujutsu and the like who made attempts to compete in judo contests. Competitors fighting in a deeply stooped position had a greater opportunity to get hold of legs. [6-7]. The rule introduced in 2010, forbidding a direct attack on legs with the help of hand grips, has led to a significant reduction of the efficiency of such techniques as kuchiki taoshi, sukui nage and kibisu gaeshi and it has eliminated the possibility of efficient execution of such techniques as morote gari, kata guruma and kata otoshi. The efficiency of the sumi gaeshi throw, frequently applied as counter-attack against techniques consisting in grappling legs (kuchiki taoshi, morote gari and kata guruma) has also fallen. Kata guruma, kuchiki taoshi and sukui nage throws (te guruma) in the past competitions belonged to the leading techniques [8].

During the 2010 WCh seven competitors were disqualified for direct grappling the opponent's legs with hands (sukui nage – 4 competitors, kuchiki taoshi – 2 competitors and kata guruma – 1 competitor). The disqualified competitors who failed to comply with the accepted amendments to sports rules constituted 1.3% of the total number of the Tokyo WCh participants. During the 2011 WCh three competitors were disqualified for a direct attack on the opponent's legs with hands (kuchiki taoshi – 2 competitors and sukui nage – 1 competitor); they constituted 0.6% of the total of the Paris 2011 WCh participants. Also during the OG in 2012 two competitors were disqualified for holding the opponents' legs (which constituted

0.9% of all participants). A small number of these disqualifications can mean that the implemented changes were accepted by participants of these competitions.

Many-year observations of competitions and their analysis aimed at finding a way of raising the efficiency of fights and improving in competitors' training [9-25]. Authors of these studies analysed the most efficient techniques applied during competitions, determining the efficiency of competitors during the most important meetings, and simultaneously they pointed at developmental directions of the technical-tactical preparation seeking means of raising the efficiency of training of judo competitors.

In the group of throws the efficiency of hand techniques (te waza) has dropped, which reduced the dominance of such throws as kuchiki taoshi, sukui nage and kata guruma. One should recognize this as a consequence of the implemented amendments to the sports rules and restrictions on direct grappling of legs. Increasing the efficiency of leg throws (ashi waza) in the 2010 and 2011 WCh was caused by a dominance of such techniques as uchimata, osoto gari, kouchi gari, ouchi gari and kosoto gari and the fact that representatives of Japan, excelling in these competitions, used these techniques the most efficiently [26]. The efficiency of executing these throws in the past years was limited by getting hold of legs while performing attacks. During the OG in 2012 there was a decrease in the efficiency of leg throws, which did not belong to dominating techniques of this competition (Tab. 3). While analysing the efficiency of techniques in subsequent years using percentage chain variability, we can observe changes in the efficiency of groups of throws and grips (nage and katame waza) (Fig. 1 and 2). The efficiency (Sa) of hand throws (te waza), leg throws (ashi waza) and sacrifice throws (sutemi waza) increased in 2009 compared to 2008 by 20%, 26% and 11%, respectively. In this period the number of points for hip throws (koshi waza) remained unchanged. In the next period (2009/2010) an increase in hip throws (koshi waza) was evident - by 44%, and in leg throws (ashi waza) - by 36%. Simultaneously, there was a significant (by as many as 36%) fall in the efficiency of hand throws (te waza). The efficiency of sacrifice throws (sutemi waza) only slightly changed. In 2010/2011 there was an increase in the efficiency of hand techniques (te waza) and hip techniques (koshi waza), although their Sa increase was not as high as in the previous season – 17% and 18%, respectively. There was a fall in the Sa value for leg throws (ashi waza) and sacrifice throws (sutemi waza) – a decrease by 12% and 20%. This declining trend in the subsequent years (2011-2012) even deepened expanding to the remaining techniques. In this period the efficiency of attack (Ea) for hand throws (te waza) dropped by 47%, of sacrifice throws (sutemi waza) by 29% and of hip and hand throws (koshi and te waza) by 9% and 14%. During the Olympic Games in London in 2012 the efficiency (Sa) of throwing techniques achieved the lowest values since 2008 (Tab 4). In the group of grips (katame waza) there was a slight decrease in the efficiency (Sa) of holds (osaekomi waza) in 2008/2009 by 21% and of chokes (shime waza) in 2009/2010

by 13%. The greatest growth of the efficiency of chokes took place in the period of 2008/2009 by 188% and in 2010/2011 by 64%. The efficiency of performing armlocks was growing the most in 2009/2010 – 86% and in 2008/2009 – 65%. The techniques of grips achieved the highest efficiency (Ea) during the Olympic Games in London in 2012 (Tab. 4).

2. The most efficient groups of techniques were hand throws and leg throws.
3. The most dominant throw was seoi nage.
4. The number of points granted for judges' penalties has fallen.
5. During the Olympic Games in London the throw technique reached the lowest mark of efficiency.

## Conclusions

1. During the analysed period the most dominant men's judo teams were from Korea, Japan and Russia.

## Piśmiennictwo

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