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Study of eagerness, interest and attitudes of Mongolian university students in physical education courses

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Study of eagerness, interest and attitudes of Mongolian university students in physical education courses

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Abstract-The value of Mongolia is a citizen who stays fit and healthful. Physical education /PE/ plays a significant role in improving the health and well-being of the students and youth who will be the leaders of the country's future development. It was observed that mental overload, inactivity, and the Covid-19 pandemic are taking a toll on students' health, physical development, and physical preparedness. The variety of credit hours for PE classes and forms of organizing physical education at state-owned universities are lacking in order to develop healthy and able-bodied citizens. Healthy and fit body is the physical culture and social values of modern students. The development level of physical education and sports infrastructure at universities does not meet modern requirements. In other words, there are not enough gymnasiums and sport halls, it is not possible to offer many kinds

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of sports to the students, there is no environment and opportunity to stimulate students' interest and to play sports in their free-time, which hinders to them for becoming well-prepared and creative individuals in the country. Therefore, in order to improve the instruction of the physical education and sports activities of state-owned universities, it is an very important issue to pay attention for the government, increase the number of gyms and playgrounds, and establish various sports grounds near university buildings.

The aim of our study is to find out if PE classes of the university meet the desires, interests and needs of the students. We developed and conducted a survey of 8 questions to determine whether the set of physical education classes meets the student's desires, interests, and needs because physical education and sports play an important role in students' development /maturity/ and the formation of character. The survey was completed by 1,000 students from the National University of Mongolia /NUM/ and the Mongolian National University of Education /MNUE/. The aim of this study was to analyze whether the norm of credit hour package, the choice of sports and the content of PE meets or not the modern student's needs since the students' desires, interests, and needs are important to improve the organization of physical education classes and implementation of PE curricula at universities. The results of the study show that the types of PE classes offered to students, the gymnasium, the field, and the planning of credit hours for PE classes are different. This is a defective side in the implementation of the goal of improving the physical development and fitness of students in PE.

Keywords: Mongolian universities**,** Physical education, Students` Attitudes, Desires, Interests

1. INTRODUCTION

Physical training and sports have been passing through historical stages of development along with the development of modern society since ancient times when human originated, and humankind has been using physical training and sports as a tool for physical education. Individual consciousness, desires, and interests are very important in acquiring any knowledge, education, upbringing, and development. Every person pays more attention and effort to something he or she enjoys, likewise, we believe that a student's favorite sport is as important as physical education. Engaging in interesting and favorite sports can have a strong influence on a student's attendance, assiduity, and attitude toward PE, and the goals of PE will achieve successfully. Many factors influence in organizing intensive and effective PE classes, however, in this study we focused on identifying students' desires, interests, and attitudes toward PE.

Physical education and physical education and sports activities will play an important role in order to achieve this substantial goal. The functional abilities of the human body, such as strength, speed, endurance, mobility, and flexibility, which are exposed during movement, work, and life in general, determine physical fitness of a person [1]. Researchers emphasize that PE and sports activities depend on the structure of mental interests and needs, and they are related to the personal characteristics,

motivations, values, attitudes, and choices of the student. Students' attitudes to PE class are determined by their needs as a subjective or internal factor, interests in PE and sports, the state of the material base as an objective or external factor, the content of the educational process, and public arrangements.

All of the proposed solutions can improve the learning procedure and give chances to pupils who have restricted education options and rely only on online courses to further their learning. Consequently, focusing on student participation is crucial to the efficiency of the learning process. [2].

Students must master their physical fitness and motor abilities, as well as their learning skills and behavior in sports activities, according to the new "Curriculum Standards." "The extent to which pupils must attain the same level and each individual's efforts to accomplish the objective should be the scope of learning goals [3].

The survey showed that, among the factors that caused dissatisfaction with the content of physical education classes, the vast majority of students (53.3 % of students of OHDNU and 40 % of students of DDUVS) indicated that they lacked opportunities to engage in their chosen sport. 43.3 % of students of OHDNU and 56.6 % of DDUVS students were forced to play a sport they did not prefer. According to the results of the survey, 43.3 % of students of OHDNU and 33.3 % of DDUVS students found physical education & sports as attractive activities. At the same time, most students of OHDNU and DDUVS preferred independent physical exercises (50.0 % and 43.3 %, respectively), and only a small proportion of students from both Universities preferred to exercise in the classroom during extracurricular activities classes [4].

2. THEORETICAL BACKGROUND

Physical education is a very broad concept. From one perspective, physical exercise knowledge refers to the theoretical and practical knowledge of regularly engaging in physical exercise and sports in society, family, and the environment, of using physical exercise, of adjusting exercise load, and of constantly improving physical fitness, work, and life skills [5].

Increasing the movement activity of university students is becoming one of the major challenges facing the country. Students' physical activity, physical education, and sports participation are declining. Physical inactivity negatively affects their health, intelligence, and learning processes, making it impossible to meet the demands of socially valuable all-round development of future citizens. In a research study conducted within the scope of the topic of developing students' interest in physical education and sports, it was stated that for the students – the future teachers, educators, and parents in the future, it is important to have high knowledge and skills in physical education[6].

On the other hand, the necessity of improving the physical training of students and providing high readiness through the training program of physical defense sports in military and police schools was also suggested [7]. The above-mentioned works of the scientists noted that improving the physical

culture and physical preparation of the students had a positive effect on the health and maturity of the students.

Physical culture refers to the achievements and results of social activities aimed at strengthening human health, increasing the potential for physical activity, and developing talents through the proper use of various physical exercises [8]. Therefore, physical culture is a form of intangible culture and an important factor in improving the health, beauty, fitness, longevity, and quality of life of students, who are the driving force of society. In the realization of this great goal, physical education classes and sports and sports activities will play a major role. Researchers have emphasized that physical education and sports activities are highly dependent on the structure of intellectual interests and needs, and are dependent on the student's personality, motivations, values, attitudes, and choices. The attitude of students to physical education is determined by their subjective or internal factors, their needs, interest in physical activity and sports, objective or external factors, the state of the material base, the content direction of the educational process, and community organization.

The state-owned universities such as MNUE with 2 sports halls, 2 credit hour packages, 8 kinds of sports, NUM with 1 sports hall, 3 credit hour packages, 14 kinds of sports, MUST /Mongolian University of Science and technology/ with 2 sports halls, 2 credit hour packages, 8-9 kinds of sports offer their PE class in accordance with student’s desires and interests. However, the MNUMS / Mongolian National University of Medical Sciences/ organizes PE class with 2 sports halls, 2 credit hour packages, 4-6 kinds of sports, and MULS /Mongolian University of Life Sciences/ organizes PE class with 1 sports hall, 3 credit hour packages, 6-7 kinds of sports (not optional) respectively by class and group system twice or three times a week. Their instruction is compulsory.

That kind of arrangements makes it difficult to provide physical education that is suitable for modern youth and university settings, and to create conditions for them to go in for their favorite sports. In the case of Mongolian State University of Arts and Culture, PE classes are not included in their program, and professional stage classes are included. This shows that the arrangements of university physical education classes are different. Opportunities will be kept open for a teacher and a student to develop joint learning plans, exchange ideas, and come up with solutions to any problems.

3. RESEASCH DESIGN

The research work included 1st-2nd year students of MSUE and MNU, with 70% of them female students. The survey questionnaires conducted among students are taken after students have studied physical education as part of their compulsory subjects and have a clear understanding of physical education, which makes the results of the study more realistic.

While physical education classes at MSUE and MNU were the same, with 2-3 credit hours, the types of sports offered to students in physical education classes varied, so it was believed that students at schools that offer a variety of sports would be able to improve their physical fitness in the type of sport they are interested in. However, it was important to conduct a survey because it was unclear

whether that many type of sports were relevant to the students' desires and interests. The results of our research will contribute to improving the needs and requirements of physical education classes, including how students should organize physical education classes, how many credit hours they should take, what sports are most popular with modern youth, and how they can develop into healthy, physically well-developed individuals.

Needs and demands of the study: Although university PE class is important to develop students' physical development, fitness, and preparation, to improve their physical ability to work and study, and to restore their health, the current reality shows that it is insufficient to meet these needs and demands. Therefore, the aim of the study was to identify the attitudes of university students towards PE class and how their needs meet.

The aim of our study is to find out if PE classes of the university meet the desires, interests, and needs of the students.

Ojectives of the study: - Analyze the specifics and differences of physical education curricula at state-owned universities, - Develop survey and collect data from students using it, - Analyze and evaluate research results.

Framework of the study: Students studying physical education at Mongolian National University of Education and National University of Mongolia.

In addition, although physical education classes can be planned in many ways and with different time loads, it is highly dependent on the availability of university and college gym space, resources, and equipment. The format and credit hour load of physical education courses also vary from country to country. For example: In Russia, physical education is included in years 1-4 for 6-8 credit hours, while in China, it is included in eyars 1-2 for 4 credit hours, and in some less liberal countries, it is included by free scheduling. In our country, it is only 2 credit hours.

4. RESULT

Data collection procedures: The survey involved 500 students from MNUE and 500 students from NUM, of which 14.5% were male and 85.5% were female from MNUE, and 40.2% were male and 59.8% were female students from NUM, for a total of 1,000 students. Although female students predominate in the survey, the higher percentage of female students at MNUE may be related to the teaching profession.

Results: The following survey was used to determine students' desires, interests, and attitudes toward PE class.

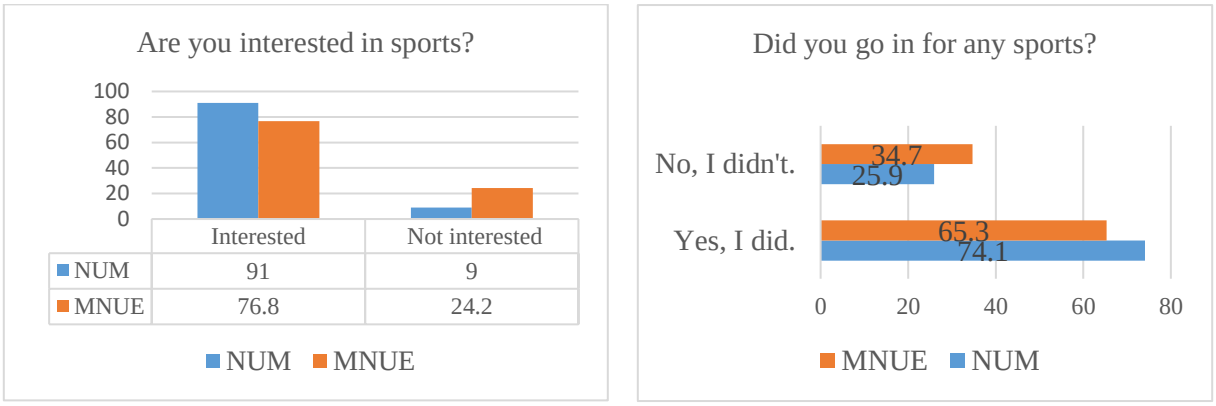


Figure 1. Interest in sports and whether you go in for any sports

According to the survey, 75-91% of students at the National University of Mongolia are interested in a particular sport, and 65-70% of students at the National University of Mongolia are interested in a particular sport before becoming a student.

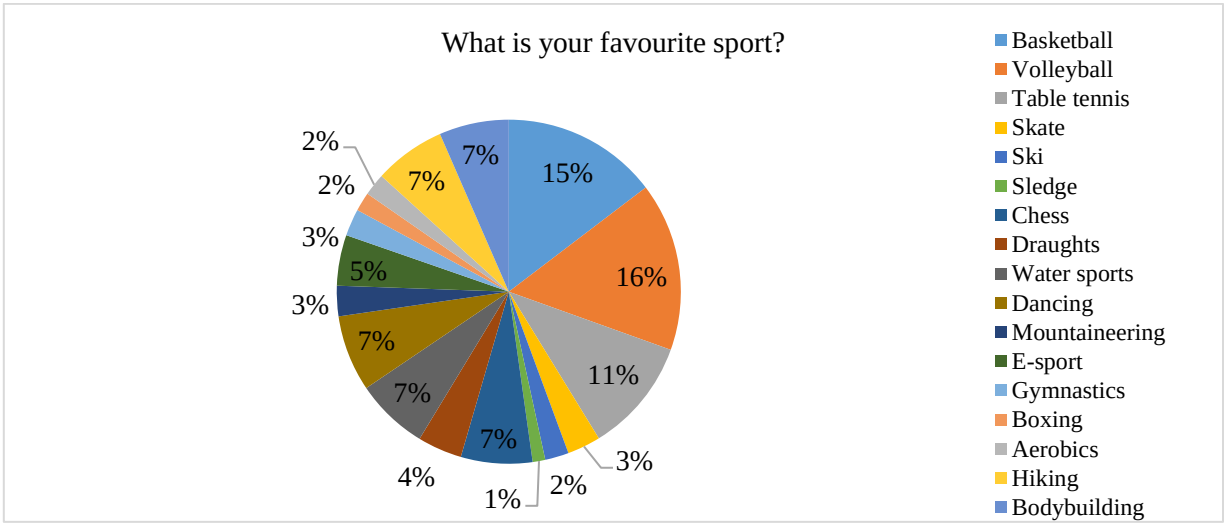


Figure 2. Student's favorite sports / Duplicated number /

Among the sports, university students who took part in the survey responded that team sports, such as basketball and volleyball, were the most popular. It accounts for a certain percentage of other sports and there is no answer that they do not like any sports at all. This shows that our students love sports.

The final results show that most students at both schools do like sports and have a strong desire to participate. However, it also showed very unsatisfactory results in terms of whether they participate in sports. The dominance of sports and games among students' favorite and interesting sports can be explained by the need for modern youth to work together as a team, learn from each other, and value the power of community.

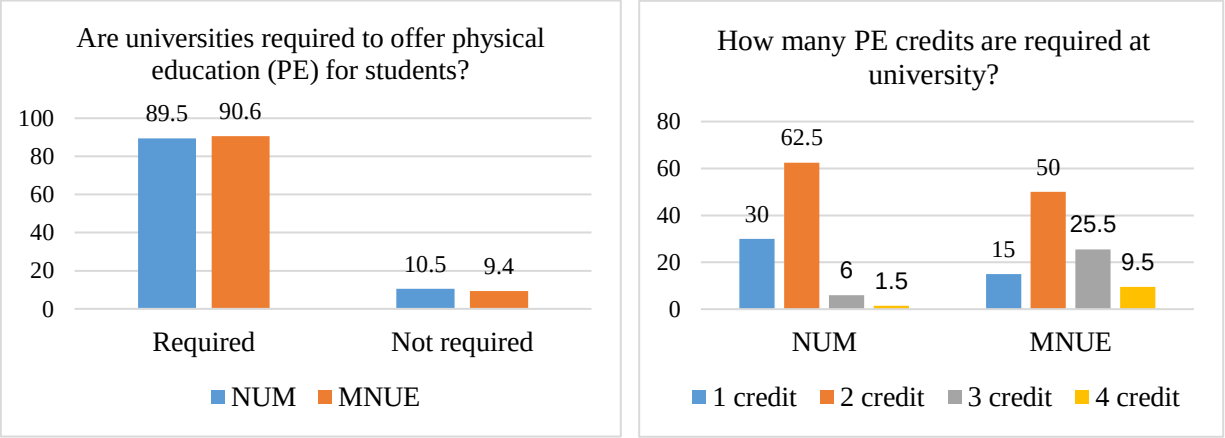


Figure 3. The requirements of PE class and credit hour packages

When asked if there should be 3 credit hour packages for PE class, 25.5% of MNUE students and 6% of NUM students agreed, but 15% of MNUE students and 30% of NUM students agreed for 1 credit. An analysis of the survey results shows that MNUE's physical education classes are taught for 2 credit hours, which is considered possible by students in the current situation, while NUM's PE class is taught for 3 credit hours, but 62.5% of students approved that 2 credit hour packages are suitable. The answer that it is best to take a credit is to focus on current educational activities and how accessible and meaningful they are for students.

Although physical education classes considered mandatory, it is advisable to increase the amount of hours of the courses. Students responded that 2 credit hours are sufficient, but in reality, the level of physical development and fitness of students is average, suggesting that physical education should be taken throughout the 4-year undergraduate program.

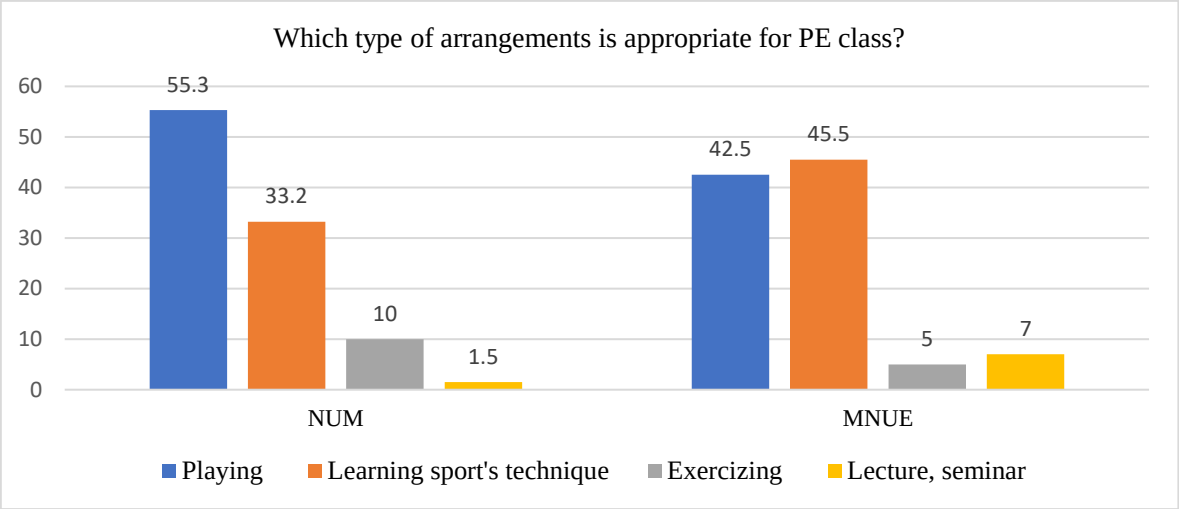
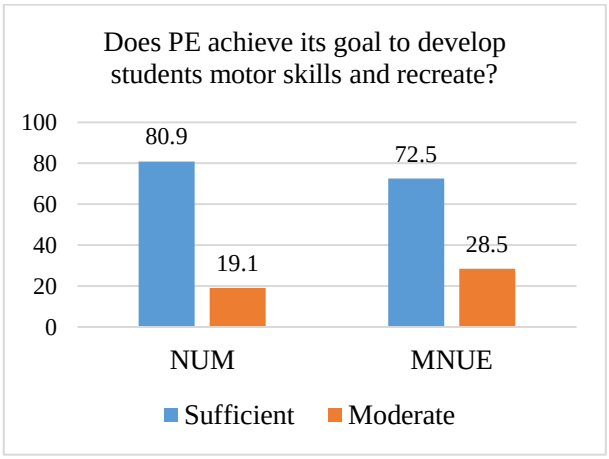


Figure 4. Forms of organizing Physical Education classes

When asked what type of physical education class students are interested in, they answered respectively that it is more effective for 43-55% play, 33-46% learn sports techniques, 5-10% do physical exercises, and 1.5-7% organize theoretical knowledge in the form of lectures and seminars. Generally, all students agreed that it was appropriate to practice and do activities, and that it was important to learn and practice sports techniques besides playing. However, a small number of hours should be devoted to theoretical knowledge in the form of lectures and seminars.



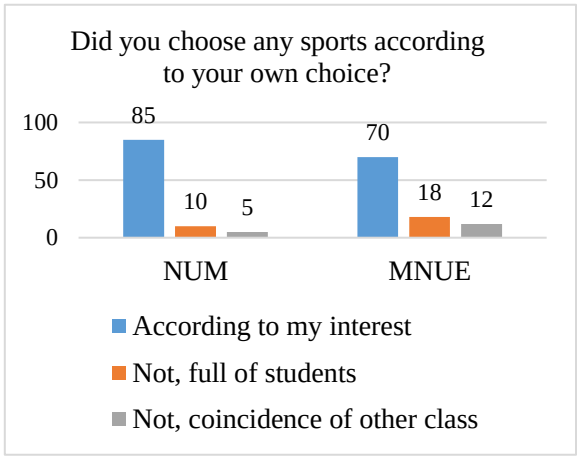


Figure 5. Satisfaction of Physical Education goals and students choice of sports

In order to determine whether physical education meets the needs and demands of students, 73-81% of the total respondents answered that they meet their goals, 19-29% answered that they did moderately, and 70-85% answered that they chose their sports according to their interests, the remaining 15-30% of the students responded that the number of students was full or coincided with other subjects.

5. CONCLUSION

First, The variety of credit hours for PE classes and forms of organizing physical education at state-owned universities are lacking in order to develop healthy and able-bodied citizens. Healthy and fit body is the physical culture and social values of modern students. The development level of physical education and sports infrastructure at universities does not meet modern requirements. In other words, there are not enough gymnasiums and sport halls, it is not possible to offer many kinds of sports to the students, there is no environment and opportunity to stimulate students' interest and to play sports in their free-time, which hinders to them for becoming well-prepared and creative individuals in the country. Therefore, in order to improve the instruction of the physical education and sports activities of state-owned universities, it is an very important issue to pay attention for the government, increase the number of gyms and playgrounds, and establish various sports grounds near university buildings.

Second, We analyzed whether the norm of credit hour package, the choice of sports and the content of PE meets or not the modern student’s needs since the students' desires, interests, and needs are important to improve the organization of physical education classes and implementation of PE curricula at the state-owned universities such as Mongolian National University of Education and National University of Mongolia, and the 70-90% or most of the students answered that physical education classes meet needs and requirements of the modern students. Although this indicator is sufficient, it is necessary to focus further research on whether students are able to develop a balanced physical development, health and a healthy lifestyle in the future.

Thirth, It has been observed that there are lots of students who like physical education and a few who do not like. When asked if physical education was compulsory, 90% of students surveyed answered they needed to attend, indicating that they needed physical education. There are remaining 10% students who did not attend physical education classes at the secondary school or had an health problems. In such cases, it is considered possible to use motivational methods and motivate these students to achieve the desired results.

Forth, When asked how many credit hours is appropriate to take a physical education class, 9% of the respondents said that it is better to study more than 4 credits, 11% - 3 credits, 50% - 2 credits, and 30% - 1 credit. According to the results of the survey, it is better to study for 2-3 credits, which is 65%, which shows that the credit hours for physical education classes included in the current curriculum are planned as much as possible. However, most of the students who preferred 1 credit were students who were not interested in physical education, had poor physical development, and did not attend physical education classes before.

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Kinematic analysis of the “Straddle jump to push up” technique in Mongolian youth aerobic gymnasts

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Kinematic analysis of the “Straddle jump to push up” technique in Mongolian youth aerobic gymnasts

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Abstract-This study examines the performance of Mongolian junior athletes executing the "Straddle jump to push up" element through two distinct preparatory techniques: initiating from a preliminary jump (Group A, n=7) and taking a 2-3 step approach (Group B, n=5). The aim is to determine which technique enables athletes to achieve a greater vertical center of gravity (CG) height at various stages of the movement. The "Straddle jump to push up" was segmented into six technical components (E1-E6) for analysis. Participants, aged 13±1 (N=12), were evaluated in the biomechanics laboratory at Chungnam University, South Korea, using a 100-frame-per-second speed camera (Motion Master), control space meter, and the Kwon 3D XP software. Biomechanical study of jumping performance of athletes allows to detect errors. Findings reveal that the CG of Group A athletes was consistently higher than that of Group B from E1 through E4, the average value was 1.11 cm at E4, the peak component. These results suggest that initiating the "Straddle jump to push up" from a preliminary jump results in a higher CG elevation.

Keywords- Preliminary jump, Difficulty elements, Center of gravity, Joint angles

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1. INTRODUCTION

The International Aerobic Gymnastics Competition consists of five age categories: men's and women's individual, double, triple, team, aerobic step, and aerobic dance. Performances are assessed by judges based on three primary criteria-execution, artistry, and difficulty-to identify the overall champions in each category. The choreographed routine in the competition requires athletes to develop a high level of physical speed, strength, flexibility, endurance, coordination, and movement skills. The composition of competition routines, which encompasses fundamental aerobic steps, auxiliary steps, transitions, acrobatics, and difficulty elements, as well as the seamless and rapid execution of skill exercises within continuous, straightforward musical movement, plays a crucial role in the evaluation of athletes' performances.

In the choreographed routines for competition, athletes perform difficulty elements-including static and dynamic strength, jumps, flexibility, and rotations-that are tailored to their respective age categories. According to the rules of the competition, junior athletes must perform 7 elements of difficulty in the simulated exercises of the competition. In the simulated exercises of the competition of Mongolian junior athletes, 57 % is the difficulty elements of the jumping group.
In the previous analysis comparing the use of Group C difficulty elements (jumps and leaps) and Group D elements (balance and flexibility) in the World Aerobic Gymnastics Championships, it was found that Group C elements (jumps) were used at a higher rate than Group D elements (balance and flexibility) across individual women's, individual men's, pairs, trios, and team categories. Furthermore, it is noteworthy that Group C contains the greatest variety of element types [1]. Junior athletes' motor training has been shown to influence the performance of the mandatory elements of competition practice, but external factors may influence the performance of the mandatory elements in combination or individually. It has been emphasized that more research is needed at this level of performance in aerobic gymnastics, which shows the possibility of the exact execution of the elements imposed by the scoring code of the sports category [2].

The purpose of this study was to analyze the changes in the height of the center of gravity depending on the pre-jumping technique of the "Straddle jump to push up" exercise of Mongolian junior athletes. This is important for the efficient execution for the athletes.
In the sports of gymnastics, the performance of difficult elements has a significant impact on the success score of athletes in competitions. Therefore, there is a need for us to conduct this research.

2. THEORETICAL BACKGROUND

2.1 AEROBIC GYMNASTICS JUMP

The elements of the jumps group are numerous. The changes of the body attitude in flight, the addition of round trips on different floors or the different arrivals, modify the jump to which is assigned a value based on the level of difficulty. Beyond what the athlete can perform during the jump, after the takeoff phase, it is essential to perform with the best technical perfection the pre-jump that strongly affects the subsequent phases of the jump itself [3]. The factors that affect the vertical force in the pre-jump have been analyzed, proving that the weight, the length of the legs,

the knee angle significantly affect it [4]. Previous study use T-test for subjects' movements and analyzed the action law of straddle jump to push up of sports aerobics so that we can find the technology structure and character. The results showed the effect was better of takeoff, but the posture of small joints was not good enough in the air; the structure was that the center of gravity was the highest firstly, secondly,the hip angle was the smallest and then divided legs angle was the biggest; the upper and lower limbs were buffering synchronization [5].

In the process of document research, it was found by scientists that the coordination of lower limb strength and stretching exercises during training and competition is very important for training athletes in jumping technique.

The final phase of the warm-up routine incorporates general and athletic explosive movements designed to stimulate post-activation potentiation. This phase is marked by an increase in muscle strength and power, which is sustained over the subsequent 4–20 minutes of high-intensity muscle contractions [6]. Warm-up exercises, including stretching and strength exercises, have distinct impacts on muscle function. While stretching exercises tend to reduce muscle strength, strength exercises enhance it. Key findings indicate that both short (15-second) and long (45-second) stretches yield comparable effects; however, a 45-second stretch led to a 12.6% increase in hip flexor flexibility, while follow-up jump performance showed a 5.5% decrease [7].

Overall, the inclusion of stretching and strength exercises in warm-up routines influences an athlete's flexibility, muscle strength, and performance. In gymnastics, athletes typically exhibit high levels of strength and flexibility relative to their body weight, which are crucial for optimal performance [8]. The static stretching should include an adequate warm-up and dynamic sport-specific activities with at least 5 or more minutes of recovery before their sport [9]. Sports that necessitate a high degree of static flexibility should use short duration static stretches with lower intensity stretches in a trained population to minimize the possibilities of impairments [10]. The results for female aerobics athletes to perform ballistic stretching in warm-up in order to improve flexibility without decreasing the following vertical jumping event and may also reduce the risk of ankle sprain injury [11]. Lower limb strength may be decreased after long periods of stretching, but performance of explosive exercises may reverse this phenomenon [12]. However, this effect is transient [13] and depends on time and stretching force [14].

The effect of pliometric and tabata training applied to aerobic gymnasts between the ages of 12-14 on jump performance and respiratory function parameters was investigated. As a result, it is recommended to trainers to use pliometric training for jumping strength and performance increase, tabata training method to increase the continuity of the series, reduce energy expenditure and increase anaerobic capacity [15]. In executing aerobic gymnastics technical elements, a high level of explosive power is needed, especially at lower-body muscle groups. In addition, to maintain the specific effort during routine length (1 min 30 s - 1 min 45 s), an optimal development of specific endurance training and a high capacity of focusing is required, in order to execute the technical elements with accuracy [16].

The research of the above scientists shows that performing the pre-jump with perfect technical performance in performing the difficulty element of the jump affects the flight phase.

2.2 BIOMECHANICS OF JUMPING

In recent years, athletes have been performing the technique of the difficulty element of the competition at a higher level, which is associated with tactics that influence success by obtaining high performance ratings. A person uses leg muscles to jump straight up in a semi-sitting position, and the center of gravity shifts to a certain height. During squatting, the center of gravity goes down in the d-distance, which means that the leg muscles do the work of jumping. F-muscle force, m-total body mass, and (d+h) is the displacement of the center of gravity from semi-squatting to maximal height. Therefore, muscle force (F~L2) depends on the displacement (d~L), and mass (m~L3) depends on length. From this, it is concluded that the height of the jump does not depend on the height of the body [18].

The center of gravity of the best jumping man moves about 0.6 meters. During a jump, the leg muscles work at about 0.3 meters. When jumping, the force of leg muscles is 3 times greater than human weight. According to the world records of high jumpers, if the center of gravity is approximately 1 meter, it means that the center of gravity is raised to an additional 1.4 meters. Therefore the remaining 0.9 meters of the center of gravity, which is raised by 0.6 meters when jumping from a standing position, can be understood as rising with the energy obtained from running [17].

Relaxation, which is inherent in the biomechanical properties of muscle, occurs when the contraction force gradually decreases for a fixed length of muscle. If the muscle relaxation during jumping is prolonged, the pushing force and jumping ability will decrease [18]. Therefore, E1 and E2, or preliminary jumps, are very important. If we consider the breakdown of the technique of jumping with legs apart, it has the following stages (photo 1):

1. Step forward with a small jump from the right (left) foot (E1)
2. Do half squats leg together or small jumps (E2)
3. Vertical jump 2 legs apart (E3)
4. Legs behind take off (E4)
5. Land in push up (E5)
6. Push up position (E6)

E1 E2 E3 E4 E5 E6

Fig 1. “Straddle jump to push up” element

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3. RESEARCH METHODOLY

12 “Gainer” and “Light” clubs junior aerobic gymnasts aged 12-14 participated in our study. When performing the "Straddle jump to push up" element, kinematic analysis was performed on the athletes performing the preliminary jump as group A, and the athletes performing 2-3 steps as group B. "Straddle jump to push up" jump is divided into E1, E2, E3, E4, E5, and E6 phases of the technical structure of the element (photo 1). 100 speed camera (Motion master), control space meter (control object), software program (Kwon 3D XP) were used in the biomechanics laboratory of Chungnam University, South Korea on November 26, 2018. Athletes were first warmed up for 10 minutes. "Straddle jump to push up" was performed 1-3 times. After attaching the sensors to the joints of the athletes, the athlete performed 1 time "Straddle jump to push up" on the field prepared with spatial sensors. The results were analyzed by extracting the average speed, average height of the center of gravity, and their standard deviation of each of the athletes E1-E6.

4. RESULTS

The athletes were divided into groups A and B because they performed the E1 step of the exercise technique breakdown in 2 ways. Depending on the push of E1-E2, the jump height of E3-E4 varies. From Table 1, the average time for Group A athletes to perform the technique is 2.21 seconds, while for Group B, it is 2.63 seconds-0.42 seconds slower.

Table 1. Average performance time (sec) for each technical component of the “Straddle jump to push up” for athletes in groups A and B.

Group		**E1**	**E2**	**E3**	**E4**	**E5**	**E6**
A	**M±SD**	0.52±1.12	1.16±1.12	1.27±1.11	1.59±1.10	1.89±1.10	2.21±1.11
B	**M±SD**	0.69±0.63	1.47±0.59	1.68±0.59	2.00±0.60	2.28±0.62	2.63±0.65

During the transition from E1 to E2, Group A athletes take 0.64 seconds, while Group B takes 0.78 seconds - Group A athletes transition more quickly. Group B’s slower time is attributed to performing E1 with 2-3 steps, unlike Group A. For the critical push in “Straddle Jump to Push Up” during E2 (semi-squat phase), Group B takes 0.29 seconds longer than Group A athletes.
For the next component, E3, Group B takes 0.41 seconds longer than Group A to perform the straddle jump. In the E4 phase, where athletes bring their legs together in the air, Group B is 0.01 seconds slower than Group A but Group B's transitions to this component is faster.

Table 2. Average height of the center of gravity (Z axis) for each component of the “Straddle jump to push up” for athletes in groups A and B (meters).

Group		E1	E2	E3	E4	E5	E6
A	**M±SD**	0.88±0.03	0.90±0.01	1.07±0.01	1.11±0.02	0.37±0.03	0.17±0.04
B	**M±SD**	0.84±0.02	0.71±0.03	1.04±0.04	1.06±0.06	0.37±0.08	0.17±0.07

From Table 2, during the semi-squat phase (E2), the average height of the center of gravity for Group B athletes is 0.71 meters—0.19 meters lower than Group A. Group B athletes have a deeper squat, leading to a lower center of gravity. For Group A athletes performing the technique after a jump, the center of gravity in E2 is 0.91 meters. The highest center of gravity shift occurs during the transition from E3 to E4, reaching 1.11 meters for Group A and 1.04 meters for Group B. There is no significant difference between Group A and B in the center of gravity for E5-E6 components.

Table 3. Average Knee Joint Angle (Degrees) for Each Component of the “Straddle Jump to Push Up” Technique by Group A and Group B

Group	food	E1	E2	E3	E4	E5	E6
A	L	155.5± 6.7	145.4±12.5	171.2±4.3	160.7±10.0	173.0±3.7	174.9±3.1
	R	156.4±9.9	146.9±11.3	171.5±1.8	156.7±10.4	171.6±2.6	174.5±3.8
B	L	148±12.5	114.3±9.1	170.2±4.5	160.4±5.0	172.2±3.4	174.9±3.8
	R	156.2±10.2	110.9±9.5	170.0±2.4	155.3±4.3	169.8±4.5	174.5±2.0

.

The optimal knee angle for jumping is between 135° and 150° [20]. The effectiveness of the push during the jump can be analyzed using knee joint angle data. If the squat is too deep or prolonged, it reduces the ability to shift the center of gravity upwards. According to Table 3, during E2 (semi-squat phase), Group A athletes who do the "Straddle jump to push" element by doing a preliminary jump have an optimal knee angle of 145°–146° for both legs. In contrast, Group B athletes (who use 2-3 steps) show knee angles of 114° for the left leg and 110° for the right leg, approximately, 32°–36° less than Group A.

When checking whether there is a correlation between the total completed time of "Straddle jump to push up" jumps with knee bending E2, group A $r=0.66$ has a strong correlation, $p<0.0001$, and group B has a strong correlation $r=0.55$ with $p<0.05$.

5. CONCLUSION

Mongolian junior athletes perform the preliminary jump (E1) of the “Straddle Jump to Push Up” technique in two ways: either initiating from a preliminary jump or with 2-3 steps approach. Comparing these approaches by dividing athletes into Groups A and B shows that those in Group B (using 2-3 steps) take longer in the semi-squat phase (E2) and push with a suboptimal knee

angle due to an excessively deep squat. Furthermore, during the center of gravity shift in E3-E4, Group B athletes exhibit lower average values than Group A. This suggests that slower muscle relaxation reduces push force. Further research is required to examine the role of muscle strength in this performance.

When analyzing the correlation between the "Straddle jump to push" element's total execution time and the semi-squat phase (E2), there was a strong statistical correlation for both groups, for Group A ($r = 0.66$, $p < 0.0001$), for Group B ($r = 0.55$, $p < 0.05$). Finally, the study found that performing "Straddle jump to push" with a preliminary jump is more efficient for junior athletes.

6. DISCUSSION

Aerobic gymnastics, as a relatively young discipline within the broader field of gymnastics, distinguishes itself through dynamic, high-energy routines set to fast-paced music. This sport seamlessly integrates intricate movements, challenging elements, and fluid transitions, fostering creativity and athleticism. Although aerobic gymnastics has yet to achieve Olympic status, it continues to evolve under the guidance of the International Gymnastics Federation, garnering growing interest, particularly among youth.

In Mongolia, the number of athletes engaging in aerobic gymnastics is steadily increasing. However, the development of internationally competitive athletes necessitates a structured and consistent approach to preparation. A strong emphasis must be placed on instilling correct foundational techniques from the earliest stages of training, as these serve as the cornerstone for mastering advanced skills. Regular evaluations of junior athletes' physical readiness, coupled with the identification and correction of technical errors, are essential for refining performance and informing progressive training plans.

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An analysis of the current state of climate change literacy: a case study of junior high school students

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An analysis of the current state of climate change literacy: a case study of junior high school students

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***Abstract*—**In today's rapidly changing climate, understanding climate change literacy is essential for students. This study assesses the current state of climate change literacy among junior high school students. A total of 2,323 second-grade students from eight cities in the Inner Mongolia Autonomous Region participated in the survey.The questionnaire, developed using the Sojump platform, was conducted electronically.Based on research indicators, students' knowledge of climate change literacy was classified as follows: high (32%), above average (35.5%), below average (23.9%), and low (8.1%). The evaluation of skills, attitudes, and behaviors related to climate change literacy yielded scores of 3.49, 3.91, and 3.75, respectively, on a 5-point Likert scale. Although the overall literacy scores were above average, further efforts are needed to enhance students' understanding of climate change concepts and implications.

***Keywords*—**Climate change, Climate change literacy, Knowledge, Skills, Attitudes , Behaviors

1. INTRODUCTION

Climate change is one of the greatest challenges facing humanity, and education plays a crucial role in addressing it([1]–[5]). UNESCO emphasizes that "the strongest weapon against climate change is education," prioritizing climate change education in its

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initiatives[6]. The objective of climate change education is to enhance students' understanding of the issue, thereby improving their literacy regarding climate change.

As a responsible large country, China has actively engaged in the international community's response to climate change and has implemented numerous policies related to climate change education. Notably, the "21st Century Agenda of the People's Republic of China"[7], the "National Plan for Addressing Climate Change," and the "Policies and Actions for Addressing Climate Change in the People's Republic of China"[8] have introduced climate change education at all levels in their policy documents.These initiatives aim to raise public awareness of environmental issues and shape students' attitudes and emotions toward the environment, thereby fostering a sense of responsibility to society. Consequently, there is a clear emphasis on changing unsustainable behaviors and lifestyles regarding the environment.Despite the implementation of climate change education for some time, research in this area remains insufficient, with most studies focusing primarily on policy advocacy and implementation[9]. The goal of climate change education is to enhance students' understanding of climate change. Junior high school represents a crucial period for students to develop personal thinking patterns and values, making it essential to systematically improve their climate change literacy.

Research question:

1) What is the level of climate change literacy of junior high school students?
2) Can the methods used in this study assess the current state of students' climate change literacy?

Research purpose: The purpose of this study is to assess the current state of climate change literacy among junior high school students.

Research objectives:

1) Conduct an analysis of the current theories and research on climate change literacy
2) Design a questionnaire to assess the current state of students' climate change literacy
3) Perform statistical analysis on the collected data

Scope of research: The study, which involved 2323 second-year junior high school students from eight cities in the Inner Mongolia Autonomous Region, focuses on establishing a solid foundation for climate change education, which is being introduced at the junior high school level.

Research method:

1) Method of document analysis / To analyze the theory and research on climate change literacy /
2) Questionnaire method /Assessing the current situation of students/
3) Mathematical statistical methods/ Utilizing IBM SPSS Statistics 27 software to process the results and conduct a reliability analysis of the questionnaires

2. LITERATURE REVIEW

Research on climate change literacy, both internationally and domestically, is rooted in the concept of climate literacy.

In 2007, the U.S. National Oceanic and Atmospheric Administration (NOAA) introduced the concept of "climate literacy" in its report titled Climate Literacy: Essential Principles of Climate Science.This concept refers to the ability of individuals or social groups to understand climate-related issues, encompassing knowledge of climate, the impacts of human activities on climate, and the effects of climate on human life and social development[10].

Researcher Vladimir Lay[11] argued that climate-literate individuals grasp the fundamental principles of the global climate system, acquire relevant scientific information, communicate effectively, and make responsible decisions.Building on this, Alenda-Demoutiez J[12] defined climate change literacy as the knowledge and skills to comprehend the causes, effects, and solutions to climate change.

According to Zhao Feng et al. [13], climate change literacy refers to students' understanding of climate change after receiving climate change education.This understanding includes recognizing the effects of human activities and the impact of climate change on social development, as well as students' ability to address the complex problems associated with climate change, which is defined by values, unique qualities, and key skills. It is important to emphasize that while climate change literacy research originates from climate literacy research, the two concepts are not synonymous. Climate literacy is a broader concept that encompasses a comprehensive understanding of the climate system, whereas climate change literacy focuses specifically on the phenomenon of climate change, including its causes, trends, and impacts.

Research by Leiserowitz A[14], Lombardi D[15], and Hestness et al. [16] examined perceptions of climate change systems and global warming causes, effects, and solutions among U.S. adolescents and adults, revealing significant misunderstandings among students. In a study conducted by Jarrett and Takacs[17]with 229 students aged 13-16, they assessed understanding of climate change concepts, such as "the difference between weather and climate," and found that students who had studied subjects like biology and chemistry could better grasp the mechanisms underlying climate change.

Chen Tao[18] discovered that gender, age, awareness of climate change, and attention levels significantly influence students' willingness to combat climate change, based on a Binary Logistic model analysis using survey data.Xu Fuhui et al. [19] compared measures of climate change attitudes and analyzed four aspects: cognition, emotion, intention, and behavior.

According to research on climate change and environmental protection awareness among primary and secondary school students in the People's Republic of China, over 50% of the more than 4,000 surveyed students lacked a sufficient understanding of climate-related terminology, while 59.5% acknowledged the importance of climate change.

Additionally, more than 80% expressed readiness to respond to climate change through daily practices such as saving water and electricity[20].

A survey conducted by Wang Xueqi and Chen Jin [21]involving 1,539 students aged 12-14 in Xiamen, Shenzhen, and Ningbo, China, revealed that coastal adolescents exhibited low levels of climate science knowledge but had a moderate awareness of climate change and mitigation measures.

Overall, previous research has primarily focused on assessing students' understanding and knowledge of climate change, along with their knowledge, attitudes, and behaviors. However, there is a lack of comprehensive research that considers all four aspects: knowledge, skills, attitudes, and behaviors related to climate change.This highlights the need for further exploration of students' concepts in this regard and the development of a comprehensive methodology for their enhancement.Therefore, this study propose evaluating not only students' knowledge but also their skills, attitudes, and behavioral levels, in order to identify effective strategies for their development.

3. METHODOLOGY

3.1 DESIGN OF THE RESEARCH

This study employed a questionnaire method and collected data electronically.The survey questionnaire was developed based on previous studies, including the Yale University Climate Change Communication Project and research on U.S. middle school students' perceptions of climate change causes. The questionnaire, which consists of 52 questions, aims to assess students' climate change literacy across four categories: knowledge, skills, attitudes, and behaviors.Each question is designed to allow only one response. The knowledge section includes 8 questions, with 1 point awarded for each correct answer and 0 points for incorrect answers. The skills section contains 16 questions, the attitude section includes 12 questions, and the behavior section has 16 questions. These sections use a 5-point scale (1 - Strongly Disagree to 5 - Strongly Agree) to measure responses. Students' climate change literacy was evaluated based on their scores in these four areas: knowledge, skills, attitudes, and behaviors.

Table 1. Students' climate change literacy level (score)

Level	**Climate change knowledge**	**Climate Change skills, attitudes, and behaviors**
	Quantification (total score)	**Quantification (average score)**
Higher (positive)	[6; 8]	[4; 5]
Above average	[4; 6]	[3; 4]
Below average	[2; 4]	[2; 3]
Down (negative)	[0; 2]	[1; 2]

3.2 STUDY GROUP

A total of 2,323 second-grade secondary school students from eight cities in the Inner Mongolia Autonomous Region participated in the survey.Among them, 64% (1,485) were from rural areas, and 36% (838) were from urban areas. The sample comprised 51% male students (1,170) and 49% female students (1,153).Regarding age distribution, 14-year-olds made up 73% of the participants (1,696), followed by 13-year-olds at 18% (418), and 15-year-olds at 9% (209). Additionally, 87% (2,020) reported practicing green travel in their daily lives, while 13% (303) did not.

Table 2. General information of study participants

General information		Quantity(N)	Percent(%)
Residence	Urban	838	36
	Rural	1485	64
Gender	Male	1170	51
	Female	1153	49
Age	13	418	18
	14	1696	73
	15	209	9
Green travel	Yes	2020	87
	No	303	13

3.3 PROCEDURE OF DATA COLLECTION

A panel approach was employed to translate a questionnaire aimed at assessing students' climate change literacy into Mongolian. The translation team included doctoral and master's students specializing in geography and education. The questionnaire on the current status of students' climate change literacy was translated from English and Chinese into Mongolian and then back into Chinese and English to ensure translation accuracy. The reliability of the questionnaire was also tested using Cronbach Alpha (α=0.976) and showed high nternal consistency.

4. RESULTS

4.1 RESULTS ON STUDENTS' LEVELS OF KNOWLEDGE IN CLIMATE CHANGE LITERACY

Two questions were developed for each of the four aspects of climate change knowledge: concepts, causes, consequences, and management. According to the survey results, 62% (1.445) answered correctly regarding the concept of climate change, while 38% (878) selected the incorrect answer, with some students confusing climate change with global

warming. Concerning the primary cause of climate change in the modern era, 60% (1.402) correctly identified human activities, while 40% (921) incorrectly attributed it to volcanic eruptions and ozone depletion.Regarding the consequences of climate change, 54% (1.244) had a correct understanding, though some students mistakenly believed that global temperatures would rise uniformly. Only 44% (1.025) answered correctly on climate change management, indicating that students' overall knowledge about climate change is inadequate.

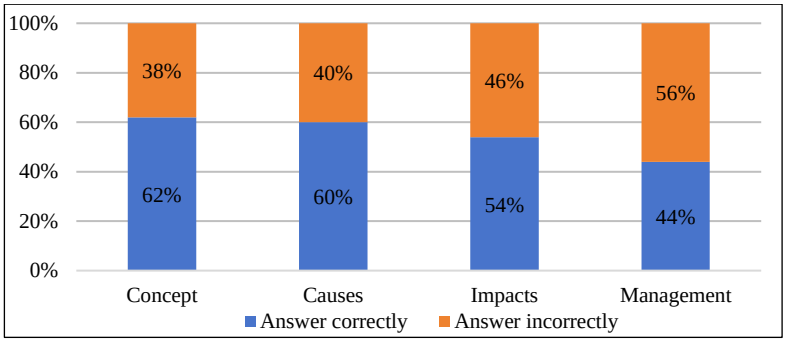

Figure 1. Students' knowledge of climate change

In terms of climate change knowledge, 32% of all students surveyed were rated as above average, and 35.5% as average, while 23.9% were rated as below average, and 8.1% as well below average.

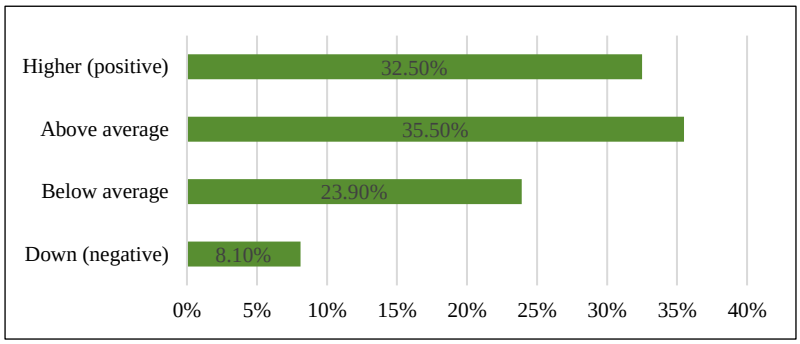

Figure 2. Level of climate change knowledge among students

4.2 RESULTS ON STUDENTS' LEVELS OF SKILLS, ATTITUDES, AND BEHAVIORS IN CLIMATE CHANGE LITERACY

The factor analysis conducted to assess the validity of the research questions categorized the 44 items into three groups, excluding those related to knowledge of climate change. The reliability analysis results indicated a Cronbach's Alpha ($\alpha = 0.976$), suggesting that the research questions effectively reflect the current state of students'

climate change literacy. This provides statistical confirmation that these questions can be used to evaluate the situation.

Table 3. Factor analysis and mean scores of students' skiils, attitudes, and behaviors toward climate change

Criterion		Mean	Standard deviation	Validity	Cronbach's Alpha (a)
Climate change skills	Skills to acquire and process information	3.43	.840	.848	.972
	Critical thinking skills	3.39	.846	.853	
	Problem solving skills	3.55	.817	.853	
	Communication and exchange skills	3.58	.804	.842	
Climate change attitudes	Cognitive component	3.99	.807	.841	.919
	Affective component	3.78	.714	.756	
	Behavioral component	3.93	.718	.801	
Climate change behaviors	Mitigation behaviors	3.79	.804	.930	.956
	Adaptation behaviors	3.70	.885	.914	
KMO and Bartlett's Test					
Kaiser-Meyer-Olkin Measure of Sampling Adequacy					.976
Bartlett's Test of Sphericity		Approx. Chi-Square			38243.711
		df			120
		Sig.			.000
Cronbach's Alpha (For 44 questions)					.976

According to these criteria and results,the average indicators of students' skills, attitudes, and behaviors regarding climate change are all above average. However, not all are satisfactory when considering the pressing issues facing society today.Therefore, there is a need for measures aimed at enhancing students' skills to engage with climate change issues, as well as promoting their active participation and response.

4.3 RESULTS ON DIFFERENCE ANALYSIS OF STUDENTS' CLIMATE CHANGE LITERACY

In terms of climate change knowledge, urban students scored higher on average than rural students.However, no significant differences were found with respect to gender and green travel.

Table 4. Differences in students' knowledge of climate change

		N	Mean	Standard deviation	t	p
Gender	Male	1170	4.41	1.996	.196	.845
	Female	1153	4.40	1.839		
Residence	Urban	838	4.75	1.902	6.484	.000
	Rural	1485	4.21	1.903		
Green travel	Yes	2020	4.42	1.910	.826	.409
	No	303	4.32	1.982		

p<.05

Additionally, the analysis of students' skills, attitudes, and behaviors regarding climate change by gender yielded the following results.

Table 5. Gender differences in students' skills, attitudes, and behaviors regarding climate change

	Gender	N	Mean	Standard deviation	t	P
Climate change skills	Male	1170	3.525	.829	2.436	.015
	Female	1153	3.447	.710		
Skills to acquire and process information	Male	1170	3.454	.900	1.658	.098
	Female	1153	3.396	.774		
Critical thinking skills	Male	1170	3.444	.895	3.345	.001
	Female	1153	3.327	.789		
Problem solving skills	Male	1170	3.587	.873	2.026	.043
	Female	1153	3.519	.754		
Communication and exchange skills	Male	1170	3.614	.844	2.066	.039
	Female	1153	3.545	.759		
Climate change attitudes	Male	1170	3.848	.695	-4.281	.000
	Female	1153	3.961	.578		
Cognitive component	Male	1170	3.941	.856	-3.548	.000
	Female	1153	4.059	.750		
Affective component	Male	1170	3.723	.782	-3.795	.000
	Female	1153	3.835	.633		
Behavioral component	Male	1170	3.879	.782	-3.711	.000
	Female	1153	3.989	.642		
Climate change behaviors	Male	1170	3.746	.847	-.212	.832
	Female	1153	3.753	.776		
Mitigation behaviors	Male	1170	3.771	.845	-.951	.342
	Female	1153	3.803	.759		
Adaptation behaviors	Male	1170	3.714	.908	.665	.506
	Female	1153	3.689	.862		

p<.05

From the table above, it is evident that boys performed better on average than girls in critical thinking, problem-solving, and communication skills related to climate change. Conversely, girls outperformed boys in cognitive, emotional, and behavioral attitudes, with these differences being statistically significant. However, no gender differences were observed concerning students' skills to acquire and process information about climate change and their behaviors.

The results of the analysis of students' skills, attitudes, and behaviors regarding climate change in residence are presented below.

Table 6. Residence-based differences in students' skills, attitudes, and behaviors regarding climate change

	Residence	**N**	**Mean**	**Standard deviation**	**T**	**p**
Climate change skills	Urban	838	3.596	.819	5.042	.000
	Rural	1485	3.424	.74		
Skills to acquire and process information	Urban	838	3.536	.895	4.676	.000
	Rural	1485	3.362	.801		
Critical thinking skills	Urban	838	3.493	.897	4.501	.000
	Rural	1485	3.325	.809		
Problem solving skills	Urban	838	3.652	.86	4.3	.000
	Rural	1485	3.498	.786		
Communication and exchange skills	Urban	838	3.703	.84	5.434	.000
	Rural	1485	3.511	.774		
Climate change attitudes	Urban	838	4.026	.677	6.749	.000
	Rural	1485	3.835	.611		
Cognitive component	Urban	838	4.152	.822	6.919	.000
	Rural	1485	3.914	.785		
Affective component	Urban	838	3.871	.746	4.607	.000
	Rural	1485	3.726	.69		
Behavioral component	Urban	838	4.055	.745	6.133	.000
	Rural	1485	3.866	.693		
Climate change behaviors	Urban	838	3.881	.827	5.888	.000
	Rural	1485	3.676	.795		
Mitigation behaviors	Urban	838	3.935	.814	6.721	.000
	Rural	1485	3.703	.786		
Adaptation behaviors	Urban	838	3.596	.819	4.510	.000
	Rural	1485	3.424	.74		

$p<.05$

According to these results, students'skills to acquire and process information about climate change, think critically, solve problems, communicate and exchange ideas, as well as their cognitive, emotional, and behavioral attitudes toward mitigating and adapting to climate change, showed that the average performance of urban students was higher than that of rural students, with statistically significant differences.

The analysis of students' skills, attitudes, and behaviors regarding climate change in relation to green travel reveals the following results.

Table 7. Differences in students' skills, attitudes, and behaviors toward climate change in relation to green travel

	Green travel	N	Mean	Standard deviation	t	p
Climate change skills	Yes	2020	3.534	.769	8.151	.000
	No	303	3.166	.727		
Skills to acquire and process information	Yes	2020	3.479	.832	8.275	.000
	No	303	3.067	.804		
Critical thinking skills	Yes	2020	3.435	.837	7.374	.000
	No	303	3.057	.832		
Problem solving skills	Yes	2020	3.601	.806	7.25	.000
	No	303	3.237	.816		
Communication and exchange skills	Yes	2020	3.621	.8	6.618	.000
	No	303	3.305	.774		
Climate change attitudes	Yes	2020	3.939	.639	6.791	.000
	No	303	3.673	.617		
Cognitive component	Yes	2020	4.033	.801	5.177	.000
	No	303	3.777	.814		
Affective component	Yes	2020	3.811	.715	5.678	.000
	No	303	3.563	.667		
Behavioral component	Yes	2020	3.972	.709	6.711	.000
	No	303	3.678	.724		
Climate change behaviors	Yes	2020	3.815	.797	10.161	.000
	No	303	3.317	.784		
Mitigation behaviors	Yes	2020	3.85	.788	10.125	.000
	No	303	3.363	.78		
Adaptation behaviors	Yes	2020	3.769	.869	9.56	.000
	No	303	3.257	.864		

$p<.05$

Based on the above results, students' skills to acquire and process information about climate change, think critically, solve problems, and communicate effectively—as well as their cognitive, emotional, and behavioral attitudes toward reducing and adapting to climate change—show that the average scores of students who engage in green travel in their daily lives are higher and statistically different from those of students who do not. This highlights the importance of green travel.

5. CONCLUSION

Previous studies have focused on assessing students' understanding and knowledge of climate change, as well as identifying their attitudes and behaviors. However, there is a lack of research that comprehensively covers students' knowledge, skills, attitudes, and behaviors regarding climate change.

Regarding students' knowledge of climate change literacy, 32% were rated as high and 35.5% as above average, while 23.9% were rated below average, and 8.1% were rated as

low. The general scores for skills, attitudes, and behaviors related to climate change literacy were 3.49, 3.91, and 3.75, respectively, on a 5-point Likert scale. These results highlight the need for actions to deepen students' understanding of climate change, enhance their skills to engage with it, and promote their active participation and response.

The average score of boys was higher than that of girls in terms of students' skills, while girls scored higher than boys regarding their attitudes. Therefore, it is advisable to implement programs and methods tailored to their interests to engage boys' attitudes in this area and enhance girls' abilities.

There is a need to focus specifically on climate change literacy for rural students and to enhance the equitable distribution of educational resources between urban and rural areas.

Green travel in everyday life plays a crucial role in developing students' climate change literacy. Therefore, schools should actively promote the concept of green travel and foster these habits in students through hands-on activities, ultimately encouraging action against climate change aimed at enhancing awareness and skills.

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Evaluation of specialized physical training for high-ranking male judo athletes

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Evaluation of specialized physical training for high-ranking male judo athletes

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Abstarct- The goal of our research was to develop and test assessment norms for identifying the strengths and weaknesses of athletes in order to scientifically develop their specialized physical training, and to find the relationship between the level of athletes' physical training and their success in competitions. For the purpose of the research 57 male athletes (25 high-ranking) from light, middle and heavy-weight classes were randomly selected. The test was conducted in two stages. In the first stage, the results of the *movement test* are converted into scores on the assessment scale, which serves as an initial score, while during the second stage, the scores obtained during the first stage are compared with the norm, which determines the final score. The standards for assessing the special physical training of athletes were developed in four stages and classified into 5 levels based on the normal distribution of athletes' achievements. By converting an athlete's performance in high-level competitions into points, it is possible to determine the average performance of athletes and compare it with their specialized physical training level. The results collected were analyzed using the SPSS-26 software. After the analysis it was determined that there is a correlation between specialized physical training of the athletes and the athletes sport achievements (r=0.536, p=0.001). The correlation was proven by athletes with specialized physical training score of 8.1 and above showing high sport achievements.

Keywords- Specialized training, Level, high-ranking, Judo, Normative

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1. INTRODUCTION

One of the key conditions for determining the results of sports coaching is the assessment of athletes' specialized training levels. With the help of the specialized training assessments coaches are able to compare the athletes' physical training level to the previous results, clarify, and adjust the training methods accordingly.

The results of a survey conducted among coaches training high-ranking athletes showed that 60% of coaches do not specifically assess the physical condition of each athlete, 20% assess it by observing the training and competition process, 10% assess it by the success archived by the athletes in competitions, and only 10% assess the specific physical condition of athletes according to appropriate procedures. This shows that the process of determining and assessing the level of specialized physical training of high-ranking athletes and conducting periodic monitoring during training is lagging. [1]

Achieving a high level in specialized physical training increases the athlete's ability to perform technical and tactical exercises with maximum strength, speed, and range, and is an important foundation for improving sports skills. Achieving success in any sport is not possible without adequate development of an athlete's physical capabilities, including speed, endurance, flexibility, and strength, regardless of the quality of technical and tactical training. [2]

Furthermore, it is essential for the coach to acquire detailed information regarding the physical capabilities of each athlete during training in order to select the most effective training methods based on this data. [3]

In his work, "Study on the Development of Special Endurance in Judo Athletes", Shiyan developed a formula and methodology for determining the coefficient of special endurance in wrestlers. Through extensive observation and experimental research, he concluded that assessing the level of special endurance in high-ranking wrestlers can serve as a predictor of their success in competitions. [4]

For wrestlers, good level of specialized training is one of the key factors in achieving high results in competitions. Wrestlers of the same level may differ greatly in physical abilities, but their individual styles differ. During the experiment, the increase in the results of special physical training of wrestlers in the experimental group was significantly higher in all tests - from 6% to 14%, and in the control group - from 2% to 3%.[5]

When determining the specialized physical training of high-ranking boxers of different weight classes, light (46-60 kg) the explosive power of a single punch was determined by the right and left straight punches, whereas the power and speed-endurance of series of punches was determined by the performance in the first 30 seconds of a one minute workout; middle-weight (60—70) explosive power and speed-power was determined by the power of a single punch; heavy-weight (over 70kg) power endurance was determined by the number of repetitions of a series of punches performed in one minute [6]. This shows that it is possible to divide the weight categories of judo athletes into light, medium, and heavy.

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Although Mongolian researchers have conducted studies on the physical development (Lkhagvasuren., 1999), (Nyam., 1999), (Khalzan., 2004), (Tuul., 2011), (Bat-Otgon., 2013), general training, and performance of elite athletes, there has been a notable gap in research focused on assessing the level of specialized physical training in high-ranking athletes and the development of corresponding evaluation standards. When analyzing the research documents conducted in the field of physical education and sports in Mongolia, there are few studies that have thoroughly studied the specialized physical training of Mongolian athletes who are achieving sports success on the world stage. The goal of our research was to develop and test assessment norms for identifying the strengths and weaknesses of athletes in order to scientifically develop their specialized physical training, and to find the relationship between the level of athletes' physical training and their success in competitions.

2. LIMITATONS OF THE RESEARCH

a. This study examines the specialized physical training levels of high-raking athletes only and does not include other athletes who have been training for several-years.
b. This study examined the specialized physical training levels of high-ranking judo athletes, who are rapidly climbing in ranks in Mongolia. In the future, it is necessary to comprehensively study the technical, tactical, and psychological training of high-ranking athletes.
c. The lack of specific movement tests to assess the specialized physical training level of high-ranking judo athletes is thought to be related to the competitive nature of the sport. This limits the ability to compare results with internationally recognized test results.

3. RESEARCH METHODS

- Document and original literature research methods, to clarify the research status of the topic and establish the context;
- Questionnaire method, to assess the physical fitness of the athletes and to clarify the future needs;
- Interview method, to apply results of the research to training and coaching, and to identify the needs for specialized physical training;
- Movement testing methods to determine the level of specialized physical training of athletes and develop evaluation standards;
- The use of programs such as Adobe Premier Pro CC (high quality video editing and slowing down) and Sketchpad (an automatic geographic drawing software to analyze the amplitude angle of movement) when processing the research results .
- The statistical analysis of the collected data was performed using the SPSS-22 program.

4. RESULTS

The study involved 16 male judo athletes with high ranks. In terms of sports ranks and titles, 12.5% were Khudulmuriin Baatar (Heroes of Labor), 6.25% were Gaviyat tamirchin (Honored Athletes), and 81.25% were Olon ulsiin master (International Masters). The average age of the athletes was 25.06±1.13, and the average time they had been practicing the sport was 10.62±1.24 years.

In comparison to the study conducted by Lkhagvasuren G. in 2002, the average age of high-ranking athletes in freestyle wrestling, judo, and boxing who won medals at the Olympics and World Championships was relatively younger in 2016 (24.37 years) compared to 2002 (25.6 years) [7]. However, in terms of the duration of their athletic careers, these athletes had 0.54 fewer years of experience, with an average of 25.06 years of practice in 2016 compared to 2002.

These figures align with the findings of researchers who state that 'an athlete must engage in a specific sport for 9-12 years to achieve significant success.' Additionally, they suggest a potential correlation between an athlete's age and the amount of time required to attain a high level of specialized physical training.

For male judo athletes, the weight categories changed a total of 5 times from 1956 to 2014. Initially, there were 4 different weight categories: 63 kg, 80 kg, 93 kg, and absolute. Since 2010, the weight categories have been increased to 7: up to 60 kg, 60-66 kg, 66-73 kg, 73-81 kg, 81-90 kg, 90-100 kg, and over 100 kg.

The weight categories seen a total of 5 changes during the 1964-1992 Olympic Games. From 1996, 7 weight categories were introduced: 60 kg, 66 kg, 73 kg, 81 kg, 90 kg, 100 kg, and +100 kg. [8]

Based on the above-mentioned weight categories, we divided the athletes in the study into three categories: lightweight (60; 66 kg), middleweight (73; 81 kg), and heavyweight (90; 100≤ kg).

Athletes with good strength endurance can hold their opponent for an extended period of time, while athletes with good special endurance can wrestle out of their opponent's holds and maintain their own for prolonged periods. For judo athletes, strength endurance helps to improve muscle strength, speed-strength helps to maintain movement speed for long periods, while general endurance helps to maintain mental stability. As such, we speculate that one of the conditions for athletes to achieve high success in competitive sports is to improve their speed-strength endurance training levels. Short term endurance or endurance while performing high intensity movements from 45 seconds to 2 minutes, in an oxygen-free environment, strength was chosen to account for 33.3%, speed - 33.3%, and endurance - 33.3%. The following results were observed when determining the speed-strength endurance level of high-raking judo athletes using a three-minute dummy-lifting movement test (Table 1).

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Table 1. Average speed-strength endurance of high-ranking male judo athletes (throwing the dummy over the shoulder, times in 3 minutes)

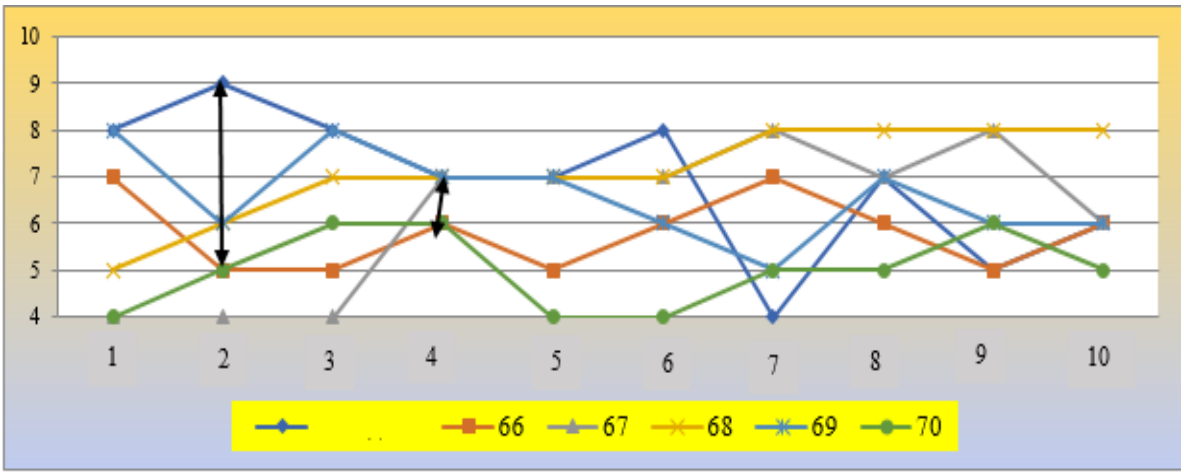
Descriptive Statistics						ANOVA		Decision
Weight class	N	Minimum	Maximum	Mean	Std. Deviation	F	Sig	
Light	7	30.00	35.00	32.7143	1.79947	42.475	.000	different
Middleweight	6	44.00	53.00	47.6667	3.01109			
Heavyweight	4	44.00	57.00	50.0000	6.55744			

High-ranking male judo athletes performed the exercise of throwing a dummy alternately over their right and left shoulders an average of 33.7 times in 3 minutes for lightweight athletes, 47.6 times for middleweight athletes, and 50 times for heavyweight athletes. When examining whether speed-strength endurance depends on weight class using ANOVA analysis showed F=42.475, p=0.000 for male athletes. From this, it was observed that the speed-strength endurance of athletes depends on weight class. A wrestler with strength endurance can maintain a hold for a longer time, and a wrestler with special endurance can perform all of the wrestling techniques at high speed regardless of the opponent. In addition to assessing the specialized physical training of athletes in a normative manner, in order to check the objective quality of the assessment, each physical ability was evaluated using the “T” scale of scientist V.N. Platonov (Platonov, 2004, p. 312). In addition, a quantitative and qualitative assessment was done to each criterion.

The results of a study that comprehensively identified and evaluated the level of specialized physical training of high-ranking judo athletes:

- First – assessing each ability that influence the specialized physical training of an athlete, identifying strengths and weaknesses
- Second - athlete evaluation density,
- Third - A map of the athlete's specialized physical training.,
- Fourth - You can see the average score of each athlete's comprehensive assessment of their specialized physical training.

For example, in the example below, when analyzing the density of the athlete's scores, the following results were observed.



1-movement coordination; 2-flexibility, right; 3-felxibility, left; 4-speed, right; 5-speed, left; 6-speed-strenght right; 7-speed-strenght left; 8-reaction speed right; 9-reaction speed left; 10-speed strenght endurance

Figure 1. Evaluation indicators (points) for each physical ability of high-ranking middleweight male judo athletes

For middleweight male athletes, the least spread can be seen in the speed ability (±1), while the most spread can be observed in the flexibility (right) ability (±5). In this movement test, the right leg of all male athletes was +3.96° more flexible than the left leg. When testing whether there was a difference in the flexibility of the right leg of the athletes compared to the left leg, the Paired Samples t test showed that the lightweight athletes t=-0.602, p=0.569; the middleweight athletes t=-0.064, p=0.952; and the heavyweight athletes t=-1.160, p=0.330. This indicates that there is no statistically significant difference between the variables. (figure 1) The average scores for the specialized physical training assessment of high-ranking male judo athletes in each weight category can be seen in Figure 2.

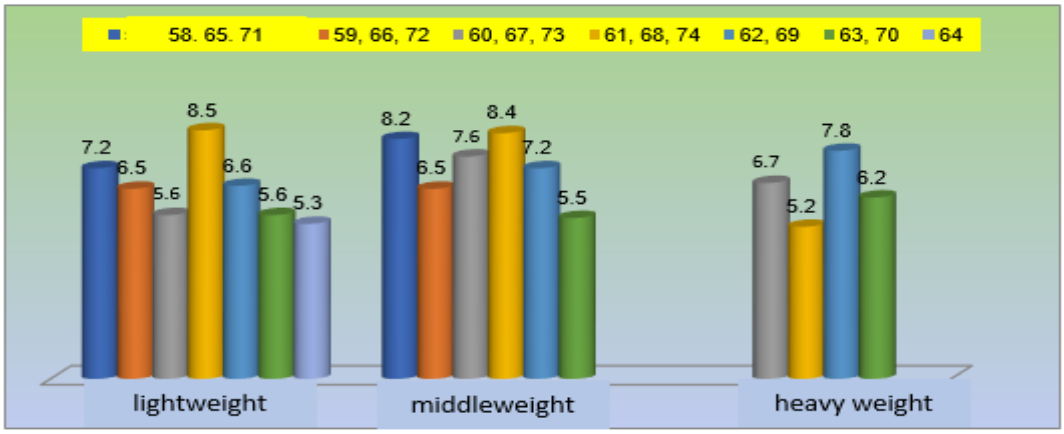


Figure 2. Average specialized physical training assessment score of high-ranking male judo athletes (points)

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The average specialized physical training scores for high-ranking male judo athletes range from 5.3 to 8.5 points (average: 6.47) for lightweight athletes, 5.1 to 8.4 points (average: 7.23) for middleweight athletes, and 5.2 to 7.8 points (average: 6.2) for heavyweight athletes. Analysis of the correlation between physical ability scores and differences in sport rankings reveals an F-value of 6.373 and a P-value of 0.004, indicating a significant correlation between physical ability and sport rank. Additionally, 83.33% of middleweight male athletes were classified as international masters (figure 2).

Mongolian athletes have consistently showcased their talents on the global stage, achieving remarkable success by winning gold, silver, and bronze medals. The performance of medal-winning athletes, who contribute points to their national team, serves as a key indicator of the level of sports development in their country. To evaluate this, we considered each athlete's achievements in their five most prestigious competitions and converted these accomplishments into points. By quantifying an athlete's performance in high-level competitions, we can determine their average success rate and compare it with their specialized physical training indicators, providing valuable insights into their overall development and effectiveness.

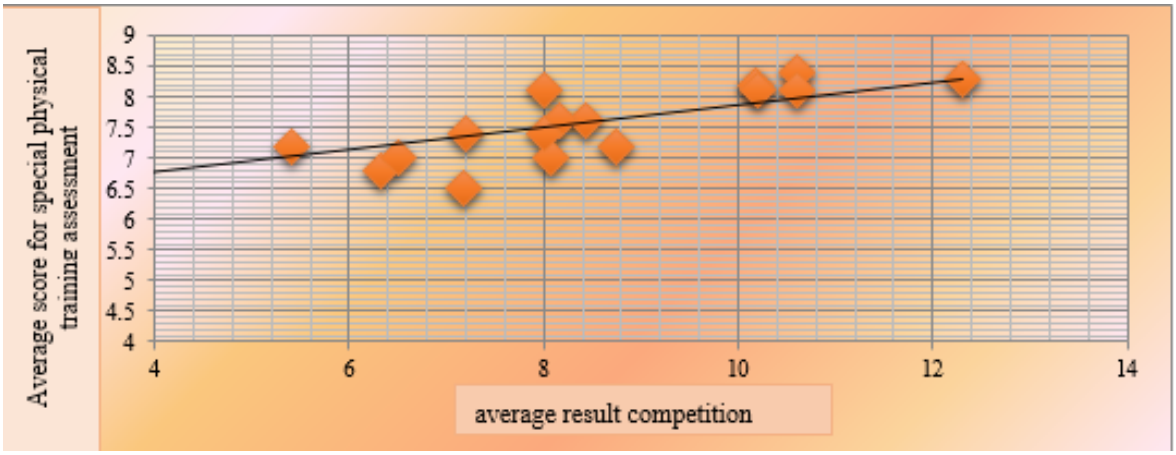

Figure 3. Average score of competition success and average score of specialized physical training of high-ranking judo athletes

An analysis using the Pearson correlation coefficient method to determine whether the average competition success score of high-ranking judo athletes is influenced by the average assessment of their specialized physical training revealed a strong positive correlation for male athletes ($r = 0.789$, $p = 0.021$).

5. CONCLUSION

First, After determining the current level of specialized physical training of high-raking judo athletes in terms of speed, reaction speed, speed-strength, speed-strength endurance, and movement coordination:

- There is a tight correlation between the athletes' speed and speed-strength ability $r = 0.583^{*}$ $p = 0.014$
- When analyzing the speed and movement coordination of heavyweight athletes using ANOVA, the results showed $F = 0.549$ and $p = 0.761$, indicating that muscle mass has an effect on these abilities.
- When examining the difference in agility between the right and left limbs of male athletes across all weight classes using the Paired Samples t-test, the results yielded $t = -2.324$ and $p = 0.103$, indicating that there is no statistically significant difference in the agility of the right and left limbs. This lack of difference is likely attributable to the fact that athletes perform similar movements with both limbs during training and competition.

Second, The results of the specialized physical training assessment conducted on high-ranking judo athletes are as follows: 8.0% achieved a very-high level, 4.0% demonstrated a high level, 40% were rated as good, 32% performed at an above-average level, and 16% were classified at an average level.

Third, Among the high-ranking judo athletes that participated in the assessment, only 12% had a high specialized physical training score. This indicates that more attention needs to be paid to the training of high-ranking athletes.

Forth, Indicates that the average assessment of an athlete's specialized physical training is significantly associated with their average competition success score. In other words, enhancing an athlete's specialized physical training is likely to lead to an improvement in their average competition success score

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Recycling and collection of waste material with system dynamics analysis

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Recycling and collection of waste material with system dynamics analysis

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***Abstract*—** We witness the accelerating effects of climate change, pollution, and resource depletion, the need for effective management strategies has never been more urgent. On the other hand, re-manufacturing of used merchandise presents a compelling opportunity for Original Equipment Manufacturers (OEMs) to enhance their environmental footprint, bolster customer satisfaction, and optimize production costs. We are investigating and evaluating the system behavior of a mining manufacturing company as a case of study, by using System Dynamics (SD). VENSIM PLE software developed the simulation model. The research method presented offers a valuable tool for examining the intricacies of Closed-Loop Supply Chain (CLSC) systems. By simulating these systems, one can gain insights into their potential benefits and drawbacks before committing to real-world implementation. This pre-emptive analysis allows for informed decision-making, mitigating the risks associated with implementing complex systems without a thorough understanding of their dynamics.

***Keywords*—**system dynamics; (CLSC) systems; supply support; supply chain

1. INTRODUCTION

Ulaanbaatar, the capital of Mongolia, faces a growing challenge in managing its urban waste. The city's population has increased in recent years, leading to a surge in waste generation. This has negatively impacted the city's appearance and cleanliness, contributing to environmental pollution and dissatisfaction among residents.

The increasing waste production has also resulted in the loss of valuable natural resources that could be conserved through recycling. This loss of resources has implications for future generations.

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Numerous studies have been conducted on urban waste management, focusing on topics such as waste generation, classification, segregation, disposal, and incineration. These studies have also explored the role of advanced technologies in waste volume reduction and management. However, there is a gap in research regarding viable solutions for reducing waste production and its associated consequences [1].

This research aims to address this gap by presenting a systematic and comprehensive approach to urban waste management in Ulaanbaatar. It utilizes a system dynamics model to predict urban waste quantities and devise suitable waste volume reduction solutions. The goal is to promote sustainable urban development and resource conservation [2].

This study adopts a descriptive-causal approach for its applied purpose and employs a survey method for data collection. The study's statistical population consists of experts and administrators of Municipality, selected through the snowball sampling method, totalling 32 individuals. Information and documents available within Isfahan Municipality related to various investigated variables have been utilized to gather the necessary data.

In tackling issues concerning urban waste volume, this study employs the system dynamics approach. System dynamics was introduced by J. Wright Forrester in 1960 to address industrial challenges [6]. It is valuable in addressing linear and nonlinear interactions within large-scale, intricate, and dynamic systems [7]. The system dynamics model comprehensively analyzes the structure, interactions, and behavior of complex systems, evaluating and forecasting their effects in an integrated manner [8]. System dynamics aims to identify system variables and their temporal interplay [9]. This approach adeptly handles the configuration assumptions and dynamic structures of systems, enabling the management of changes within subsystems and interrelationships across the complete system [10].

System dynamics is a technique for analyzing intricate systems over time, facilitated by computer simulation software [11]. Variables are perceived as system components interconnected through mathematical mappings established by differential equations, which are numerically solved via simulation [12]. The process of this research is outlined in Figure 1.

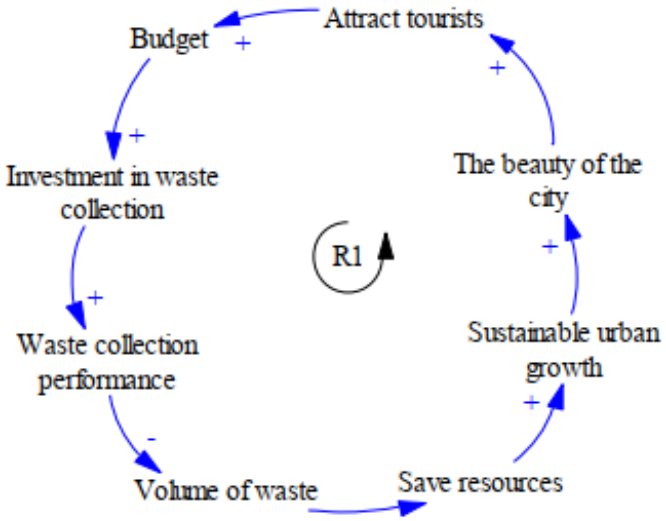

Figure 1. The feedback loop

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2. DYNAMIC HYPOTHESIS

This paper explores dynamic hypothesis, a conceptual model that utilizes reinforcing and balancing loops to analyze the relationship between key variables. This model serves as a foundational tool for understanding complex systems, particularly in the context of sustainable urban growth [2,3]. The dynamic hypothesis, illustrated in Figure 1, focuses on the relationship between investment in waste collection, waste collection performance, volume of waste, resource saving, sustainable urban growth, and city beauty.

Key Variables and Relationships:

H1: Investment in waste collection positively impacts waste collection performance.

H2: Waste collection performance influences the volume of waste.

H3: Volume of waste directly impacts resource saving.

H4: Resource saving contributes to sustainable urban growth.

H5: Sustainable urban growth enhances the beauty of the city.

The dynamic hypothesis reveals a positive feedback loop within the system. Increased investment in waste collection leads to improved performance, resulting in reduced waste volume [3, 4]. This, in turn, promotes resource conservation and sustainable urban growth, ultimately enhancing the city's beauty and attracting more tourists. This positive feedback loop highlights the importance of investing in waste management for the long-term well-being of city.

3. CAUSAL LOOP DIAGRAM

According to the determination of dynamic hypotheses and the identification of indigenous and exogenous variables of the model, the causal loop diagram is shown in Figure 2.

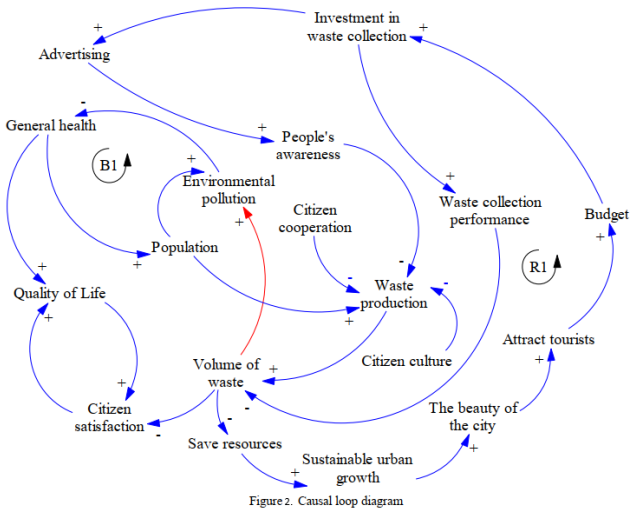

Figure 2. Causal loop diagram

4. STOCK AND FLOW DIAGRAM

The stock and flow diagram, presented in Figure 3, is a visual representation of the interactions between variables related to the volume of waste. It serves as a foundation for constructing a quantitative model that analyzes the system over a 10-year timeframe, evaluated at 12-month intervals. This diagram was developed by establishing relationships and mathematical equations among the variables under investigation.

The diagram encompasses a total of 35 variables, with six being stock variables. These variables represent the key elements of the system, and their relationships are depicted through flows and connections. The development of the diagram involved careful consideration of both quantitative and qualitative relationships, as well as numerical functions.

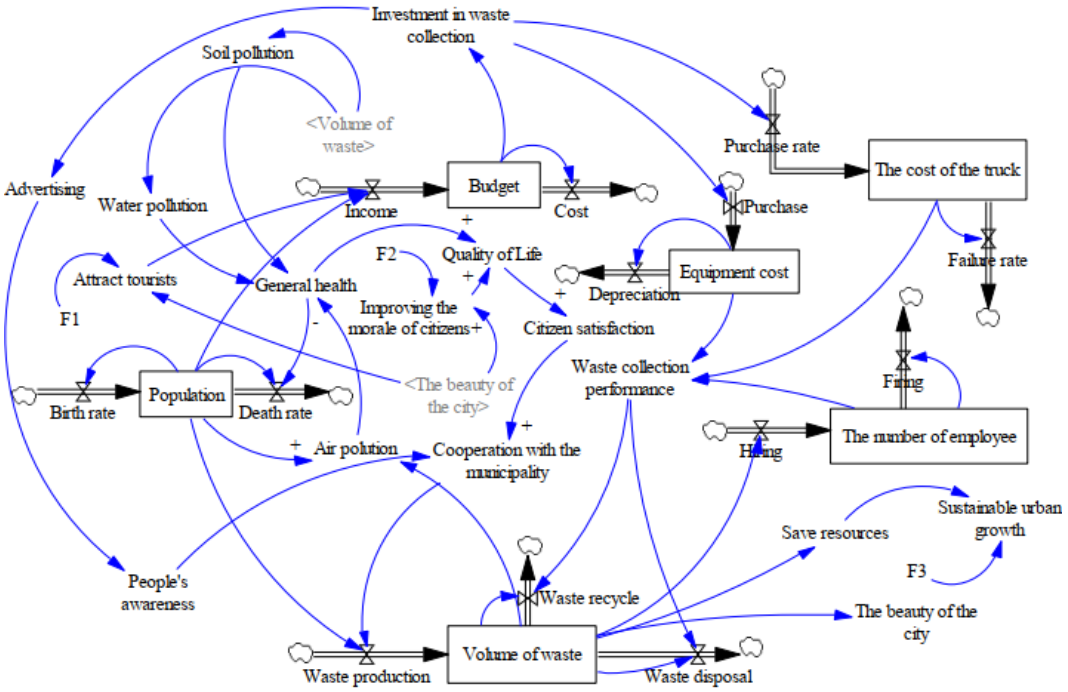

Figure 3. Stock and flow diagram

We found the process of creating the stock and flow diagram to be a valuable exercise in understanding the complex dynamics of waste generation and management. The diagram provides a clear and concise representation of the system, allowing for a more comprehensive analysis of the factors influencing waste volume [5]. The use of mathematical equations and numerical functions ensures that the model is grounded in data and can be used to make informed predictions about future trends.

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5. MODEL VALIDATION

The model's validation process is conducted in three phases, as outlined below.

5.1. Model structure evaluation test

This evaluation aims to align the model's structure with the existing knowledge within the system. In this research, urban waste management was initially identified based on the research context and subsequently refined through insights from experts and administrators in Isfahan. Ultimately, the structure of the designed model was validated by incorporating the feedback and opinions of Isfahan's experts and administrators.

5.2. Parameter evaluation test

The parameter evaluation test ensures the congruence between parameter values and their counterparts. Since the variables in this study were derived from the research context, related literature, Isfahan Municipality's documents, and expert opinions, the values align with those presented in pertinent documents and research.

5.3. The limit condition test

The assessment was conducted to evaluate the logical behavior of model variables under extreme scenariosIn this test, the value of a specific model variable gradually decreases toward zero while observing the resulting behavior of other variables that are influenced by the changed variable. For this research, the income variable has been selected to be reduced to zero, and the subsequent behavior of certain impactful variables from the budget is illustrated in Figure 5.

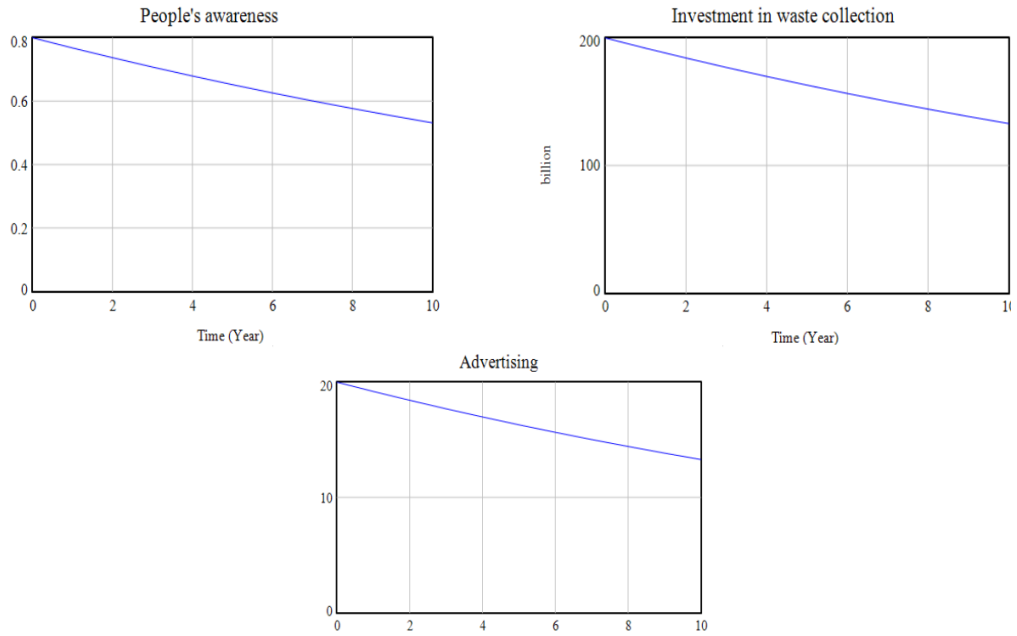

Figure 5. Model testing and validation

As shown in Figure 5, if the income amount approaches zero, the waste collection, advertising, and public awareness investment will gradually diminish over time. It demonstrates how changes in income can directly impact the allocation of resources towards waste management activities and initiatives.

5.4. Behavior reproduction test

In order to verify the correctness of the model's behavior, this test will compare the simulation results with actual data. The figures' findings demonstrate how well the researched variable may be replicated. The results are shown in Figure 6.

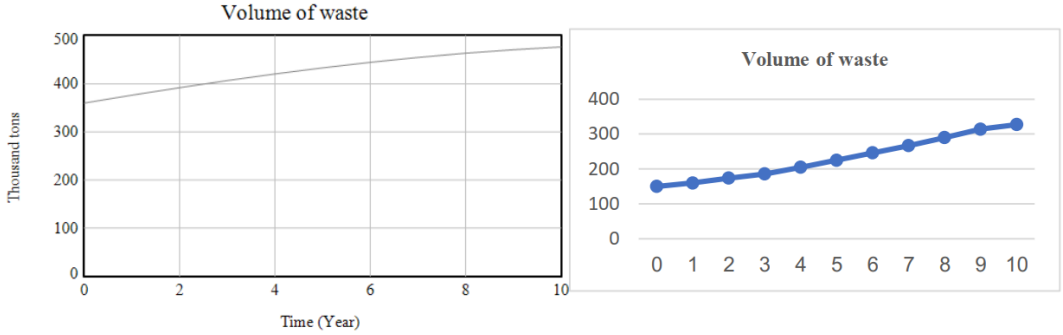

Figure 6. Comparison test with reference behaviour

6. SIMULATION RESULTS

The model has produced the following results as a consequence of the behavior of the key factors and key indicators in the volume of waste by the relationships between the model's variables that were indicated.

Implementation and evaluation of policies

This section presents the simulation results and analysis of three carefully designed scenarios. It is worth noting that in this research, three specific scenarios are developed: one that increases investment allocation in the equipment sector, another that enhances investment in advertising to boost people's awareness of waste management and urban waste, and a third scenario that simultaneously increases investments in both advertising and equipment.

The policy of increases investment allocation in the equipment sector

Figure 7 illustrates the behaviors of variables associated with waste volume when there is an increase in investment in the equipment sector for waste collection.

Figure 7. Result of policy of increases investment allocation in the equipment sector Figure 7 shows that the amount of urban waste in Isfahan will gradually decrease as investment in the sector of waste collection equipment rises. Consequently, the demand for employees in waste collection will decrease gradually, leading to increased budget allocation

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due to reduced investment needs in the waste collection sector. Moreover, the increased investment in the equipment sector for waste collection and pollution reduction is a foundation for enhancing public health. As a result, the mortality rate due to environmental pollution will decrease over time, fostering population growth. Furthermore, the outcomes of increased investment in waste collection equipment indicate that other aspects will also witness improvement. These include the storage and sustainability of resources, the aesthetics of the city, and the attraction of tourists.

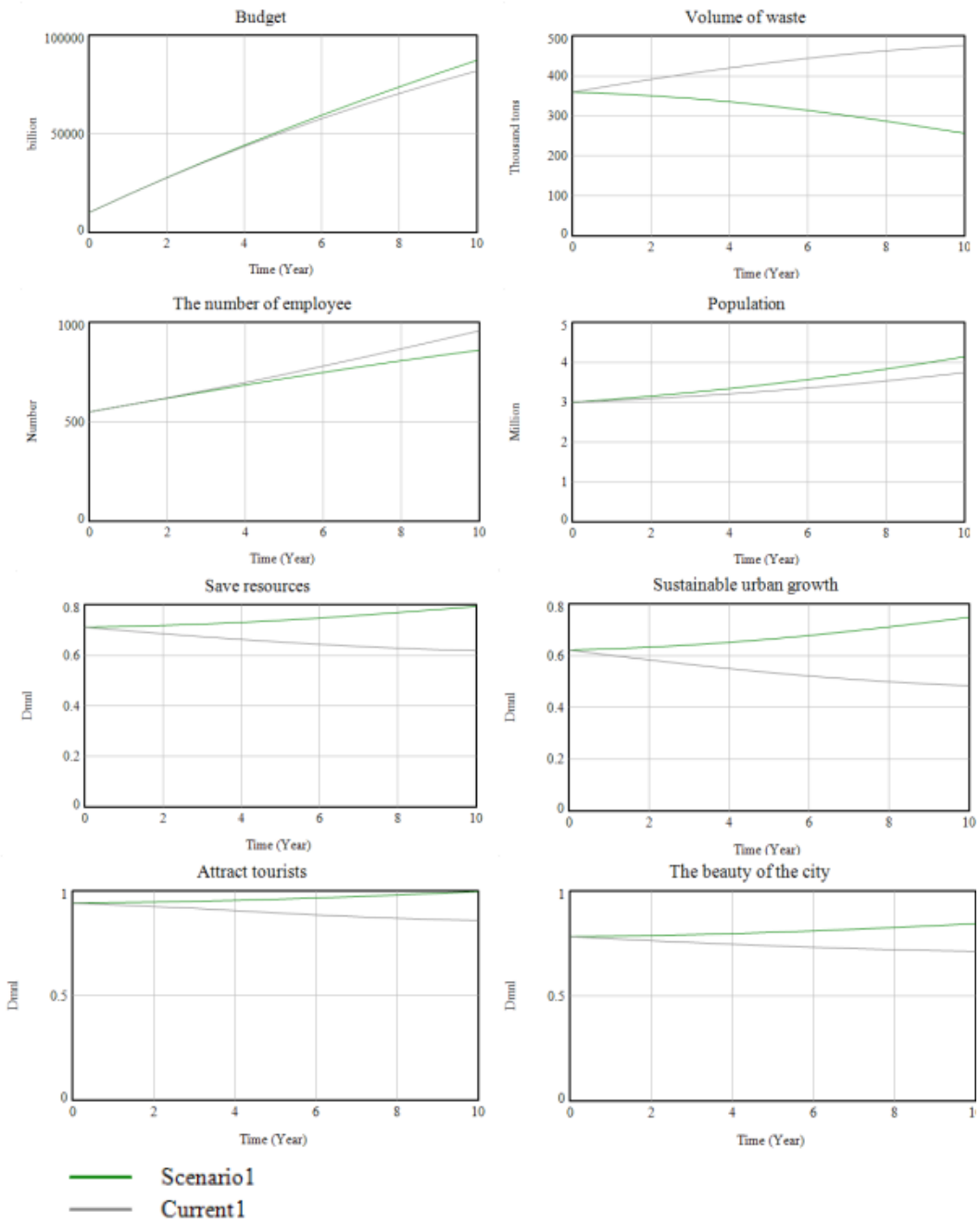

Figure 7. Result of policy of increases investment allocation in the equipment sector

In today's world, effective urban waste management holds significant importance for various societies. Neglecting waste management and urban conditions can have numerous consequences, including escalated environmental pollution and compromised citizen health. Additionally, it can diminish the beauty of the city and attractiveness, resulting in citizen dissatisfaction, resource depletion, and a decline in tourist attraction, among other issues.

This research aims to develop a simulation model that predicts the volume of urban waste in Isfahan over the next ten years and assesses its consequences. In order to achieve this goal, the research literature was analyzed to identify the factors influencing the volume of urban waste. Subsequently, the identified factors were adapted to the local context of Isfahan through the valuable insights of experts and administrators. The research investigated the dynamics and behavior of each identified factor in urban waste management through the system dynamics approach.

7. CONCLUSION

This research, conducted using the system dynamics approach, aimed to optimize waste and urban waste management in Ulaanbaatar. The study began by identifying variables influencing waste volume, drawing upon existing literature and research. These factors were then refined and localized by incorporating insights from experts and city administrators in Ulaanbaatar. Dynamic hypotheses and causal loop diagrams were constructed based on the combined knowledge from literature and expert opinions.

The study developed a stock and flow diagram by designing the causal loop diagram, exploring the quantitative relationships among the identified variables. This research established a comprehensive framework to reduce waste volume in Ulaanbaatar by formulating various scenarios. The research outcomes indicated that waste production and volume could be effectively controlled within the city, promoting resource conservation and sustainable growth.

I believe that future research should expand beyond the factors examined in this study. It could investigate additional aspects, such as the impact of immigration on waste production, considering waste generated by newcomers, and analyzing the potential role of government assistance in supporting the municipality's waste control efforts. By broadening the research focus, a more holistic understanding of waste management dynamics can be achieved, leading to the development of even more comprehensive strategies.

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Some issues in refining of the law on utilization of non-lethal personal weapons

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Some issues in refining of the law on utilization of non-lethal personal weapons

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Abstract: This paper aims to analyze the implementation of laws and regulations governing the relationship related to the utilization of non-lethal personal weapons, which are the legal guarantees necessary for the performance of this work and duty, and their norms, to study the relevant laws and legal acts of other government organizations with special functions and similar foreign countries. Additionally, some suggestions for recognizing and resolving these issues have been proposed. Thus, it is considered to be required in order to further enhance and perfect the laws pertaining to non-lethal personal weapons.

Key words: Non-lethal personal weapons, Legal regulations, Norms

1. INTRODUCTION

Purpose and Significance of the study: The primary aim and overarching significance of this research endeavor are to undertake a comprehensive analysis of the statutes and regulations dictating the utilization of specialized equipment by individual law enforcement officers and their practical enforcement. In addition, this study seeks to conduct a comparative examination of the legal provisions akin to such regulations within foreign law enforcement entities and domestic governmental agencies endowed with distinctive operational mandates. Furthermore, the research endeavors to identify and subsequently mitigate any latent issues that may arise in the course of this inquiry.

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2. THEORATICAL BACKGROUND

Numerous distinguished scholars and researchers have dedicated their efforts to the investigation of non-lethal personal weaponry, with notable contributions from figures such as S. Nyamjav [1] B. Batjav [2] S. Khayangarvaa [3] Z. Chuluunkhuu & Ch. Erdenechuluun [4] J. Dolgorsuren & D. Bulgan [5] N. Ganbadral[6], Sh. Chuluun[8], and Z. Tserenbat[9]. This extensive body of work encompasses an exploration of police weaponry, non-lethal personal arms, tactical maneuvers, and specialized equipment. Notably, S. Nyamjav [7] has authored a seminal publication elucidating methodologies for the judicious employment of specialized gear, as well as the disciplined application of force, all meticulously aligned with the contours of legal regulations.

Furthermore, Tserenbat Z. [10] delves into the strategic deployment of police weaponry and specialized apparatus, while Chuluun, Sh. [11] addresses concerns surrounding the augmentation of legal frameworks pertaining to the use of firearms and specialized equipment by law enforcement. Batmunkh, J. [12], in the context of public unrest, grapples with a multitude of legal issues, especially those concerning the utilization of specialized tools with far-reaching implications.

At the master's level, D. Ankh-Erdene [13] has undertaken in-depth research pertaining to the legal constraints governing the use of non-lethal personal weaponry by individual police officers.

L. Bat-Ochir [15] successfully defended his doctoral dissertation on the intricate subject of 'Arrest and Detention of Criminals: Actions Resulting in Harm During the Period: Theoretical Framework and Legal Regulatory Aspects.' Additionally, N. Ganbadral [14] contributed significantly to this academic landscape. Their collective scholarly pursuits revolve around a comprehensive investigation into 'The Juridical Terrain Surrounding the Employment of Special Instruments in the Exercise of Administrative Authorities by the Mongolian Police,' firmly grounded in legal theory.

These pioneering researchers have meticulously undertaken the endeavor of conducting rigorous inquiries to underpin their doctoral works.

3. MAIN ISSUES

Police officers are authorized to employ physical force, specialized equipment, and firearms against one or more individuals or groups, adhering to the prescribed criteria and protocols delineated in Article 47, Part 1 of the Law on Police Service. The law bestows upon all individuals the prerogative to utilize specialized tools, as explicitly stipulated. Within the same legislative framework, one may also find the comprehensive directives governing the 'Use of Physical Force, Special Equipment, and Firearms by Police Officers,' which have received the imprimatur of the Ministers of Justice, Internal Affairs, and the State Prosecutor General. These directives encompass the categorization, authorized grounds for deployment, prerequisites, and instances of prohibition.

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However, the legal stipulations regarding the application of non-lethal personal weapons by each police officer are somewhat vague and encompass a broad spectrum within these regulations. Furthermore, certain provisions of the legal act appear to harbor some discrepancies, which deviate from both theoretical underpinnings and practical realities. These discrepancies manifest as follows:

The directives enshrined in the aforementioned instructions delineate scenarios in which the use of individual non-lethal personal weapons is deemed unsuitable for their intended purpose and, consequently, must not be employed. To illustrate, take note of section 3.14 of the instructions, which pertains to the deployment of stun guns.

Subsequent to determining the rationale for deploying a stun gun, the police officer positions it at a range of four to five meters from the target. The firearm is then directed in such a manner that it transitions position and operates for a maximum of three seconds in a single location (or five seconds in the case of use against animals). This method is explicitly outlined.

This practice suggests the importation of stun guns into our country from China for utilization by law enforcement and other government entities. The pertinent legislation prescribes the allowable distance for deploying stun guns, contingent upon the equipment's capabilities employed by law enforcement. In my view, this aspect has been adequately addressed. Given that the device's capabilities can vary depending on its origin and manufacturing processes, it is reasoned that further regulation through directives and regulations is superfluous, as it cannot be comprehensively governed by statutory provisions or other legal instruments.

Consequently, under specific circumstances, it appears that the choice of non-lethal personal weapons, based on their functionality and capabilities, may at times diverge from the stipulated requisites set forth in the law.

Section 3.13 of the 'Use of Physical Force, Non-Lethal Personal Weapons, and Firearms' instruction stipulates guidelines for the employment of stun guns, emphasizing the following precautions: a/ Avoid deploying stun guns against a person's exposed or clothed body when there is rain, or refrain from using them in a manner that involves striking, stabbing, impacting objects to create noise, or utilizing weapon-like objects as a deterrent, as delineated in Table 1.

The aforementioned regulations pertaining to the utilization of batons by law enforcement, border security, and police officers have given rise to corresponding regulations governing the use of batons by domestic military personnel. These regulations have evolved to ensure their suitability for specific contexts and to provide legal safeguards. However, it is noteworthy that legislation governing interactions between the police and personnel in border protection and judicial enforcement agencies explicitly restricts the use of batons for actions such as wrapping around, striking, or stabbing along the body's bones and muscles. This signifies a delineation of the scope and objectives for such applications.

c/ It is advised to refrain from repeatedly striking the same individual with a baton to minimize harm. Law enforcement officials are mandated, in accordance with Article 5 of the Basic Principles of Using Firearms and Force by Officials Responsible for Public Order Maintenance, to prioritize the following: b) Respect for human life and the minimization of harm, in accordance with international law, when utilizing force. This emphasizes the fundamental principles of morality, ethics, and the

complex situations wherein it may not be feasible for a police officer to discharge their duties effectively using specialized equipment, as outlined in the instructions. Moreover, it is perceived that adherence to these guidelines in the instructions may not fully address the employee's situational risks.

Electric stun guns are deployed under various nomenclatures across the globe. In both the United States and international contexts, military, law enforcement, and correctional entities commonly employ electric stun devices referred to as 'TASERs,' a nomenclature derived from the science fiction affinities of the inventors, inspired by the 'Thomas A. Swift Taser Gun' (USGAO, 2005).

"Taser bullets can range from 15 feet (4,572 meters) (civilian model) to 25 feet (7,62 meters) (law enforcement model). Regardless of the length of the wire, the Police Executive Research Forum's (PERF) recent Best Information Guide recommends that targeting be limited to less than 15 feet (2004). This is consistent with research showing that accurate placement beyond 15 feet is difficult (Mesloh, Honych, Hoagland, & Thompson, 2005), and earlier studies reported that the effectiveness of this weapon ranged from 50% to 85% (Donnelly, 2001). In four hundred randomized controlled trials, TASER was immediately successful in 68% of cases (Mesloh, Henych, Hougland, & Thompson, 2005).[†]Based on this, it appears that "TASER" is a more specialized tool than the stun gun used in our country.

[†] https://www.ojp.gov/

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Table 1. A comparative analysis of the statutory provisions delineated in pertinent legal enactments governing the utilization of batons by officers within specialized organizations responsible for safeguarding national security[3].

№	Police	Internal troops	General Executive Agency of Court Decision	Customs and Border protection
1.	"The 'Guidelines for the Deployment of Physical Force, Specialized Equipment, and Firearms,' endorsed through collaborative directives under the imprimatur of the Minister of Justice, Minister of Internal Affairs, and the State Prosecutor General, bearing the reference numbers A/224 and A/102, and promulgated on September 6, 2017."	The 'Directives for the Deployment of Special Tools, Firearms, and Specialized Equipment for Utilization by the domestic military in the execution of their official functions,' formally sanctioned through Order No. A/57, dated April 3, 2018, as issued by the Minister of Justice and Internal Affairs	The Regulations for the Utilization of Physical Force, Specialized Equipment, and Firearms by personnel within court decision enforcement agencies,' duly endorsed through collaborative directives issued by the Minister of Justice, Minister of Internal Affairs, and the State Prosecutor General, bearing the reference numbers A/260 and A/112, and enacted on October 18, 2017.	The 'Guidelines for the Deployment of Physical Force, Specialized Equipment, and Firearms by personnel within border protection organizations,' officially ratified through Order No. A/160, dated April 3, 2017, as issued by the Minister of Justice and Internal Affairs.
2.	Section 3.13 of the instructions necessitates careful consideration when employing a rain gun, stun gun, or stun gun, specifically: a/ Utilize the rain gun to encircle the bones and musculature of an individual's attired or unclothed body, employing it for striking, thrusting, impacting external objects, generating auditory disruptions, or as a countermeasure against potential assaults with weapon-like implements.	In accordance with Section 3.8 of the instructions, meticulous attention should be accorded to the utilization of a rain gun, stun gun, or stun gun, specifically with respect to the following stipulations in Section 3.8.1: Precisely directing the raincoat onto the clad or unclothed body, accomplished through methods such as striking, thrusting, shield-based impacts, utilization of other implements, auditory disruption, or its deployment as a defensive measure in response to potential attacks involving weapon-like objects.	Section 3.14 of the Regulations pertains to the use of batons and outlines the following procedure in Section 3.14.1: Halting an action by encircling, striking, or thrusting the baton along the skeletal structure and musculature of the human body.	Section 3.14 of the guidelines delineates the application of the baton in the following manner in Section 3.14.1: Ceasing an action by enveloping, striking, or thrusting the baton along the osseous and muscular framework of the human body.

[3] https://legalinfo.mn/

4. CONCLUSION

In summation, the guidelines delineate scenarios where the utilization of non-lethal weapons may not be feasible, should a police officer misinterpret certain principles enshrined within international legal norms and standards, notwithstanding the legal mandate underpinning their duty. Furthermore, adhering to the directives within the instructions does not unequivocally eliminate the potential risks that may confront the law enforcement officer. Additionally, in certain instances, it is postulated that the intended function and capabilities of each specialized tool may run counter to the provisions articulated within the legal framework.

The effective utilization of each non-lethal weapon is contingent upon an officer's capacity to exercise sound judgment, requiring a context that closely mirrors real-life situations. Law enforcement personnel must possess the ability to make impartial assessments when confronting criminal activities and transgressions in direct encounters. Erroneous decisions by an officer in use-of-force scenarios can jeopardize their personal safety. Consequently, there is a compelling need to comprehensively address the legal provisions that enhance their status.

Hence, there is a perceived necessity to amend specific facets and provisions within the 'Use of Physical Force, Special Equipment, and Firearms' guidelines. This adjustment is vital for mitigating risk factors in the officers' operational environments and ensuring the formulation of judicious tactical decisions.

5. SUGGESTIONS AND RECOMMENDATIONS

1. A comprehensive review is warranted, wherein the regulations governing the use of specialized tools, as outlined in the instructions, are scrutinized vis-à-vis the pertinent articles and clauses delineated in international treaties and agreements, in conjunction with the 'Law on the Police Service of Mongolia.' This examination should culminate in the meticulous redefinition and modification of said regulations to harmonize them with the exigencies of reality, duly informed by empirical research.
2. It is suggested to incorporate select legal provisions from state entities with specialized functions and law enforcement agencies of foreign nations, along with the associated legal norms they uphold, into the domestic legal framework. This integration aims to augment the legal landscape by assimilating best practices and international standards."

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